PROJECT MANUAL

FOR

TEMPLE ACADEMY PERFORMING ARTS CENTER

Hacienda La Puente Unified School District

Prepared by

RACHLIN PARTNERS INCORPORATED
8640 National Boulevard
Culver City, CA 90232

For

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT
15959 E. Gale Avenue
City of Industry, CA 91745

APRIL 2024

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-122864 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 10/03/2023

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ARCHITECT
C-26229

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SECTION 00 00 02

PROJECT DIRECTORY

CLIENT	**HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT** **Contact: JOEL DUARTE** 15959 East Gale Avenue City Of Industry, CA 91745 Tel: 626-933-3932 Email: jduarte@hlpusd.org
DISTRICT REPRESENTATIVE	**HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT** **Contact: ROBERT SEGARRA** 15959 East Gale Avenue City Of Industry, CA 91745 Tel: 949-900-0440 Email: robert.segarra@cumming-group.com
PROJECT ARCHITECT	**RACHLIN PARTNERS** **Contact: Richard Ingrassia, AIA** 8640 National Blvd. Culver City, CA 90232 Tel: 310-204-3400 Fax: 310-204-3815 Email: ringrassia@rachlinpartners.com
CIVIL ENGINEER	**VCA ENGINEERS, INC.** **Contact: Andrew Coleman** 3651 Medford Street Los Angeles, CA 9006e Tel: 232-729-6098 Email: andrew.coleman@vcaeng.com
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TEMPLE ACADEMY PERFORMING ARTS CENTER

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NOTICE INVITING BIDDERS

NOTICE INVITING BIDS

NOTICE IS HEREBY GIVEN that the Board of Education of the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, of Los Angeles County, California, will accept bids up to but not later than **May 28, 2024, at 2:00 pm,** at the Purchasing Office at HACIENDA LA PUENDE USD, located at 15959 E. Gale Avenue, City of Industry, California 91744, at which time bids will be opened for the following:

BID: 2023-24.06R1
TEMPLE ACADEMY PERFORMING ARTS CENTER

There will be a mandatory Job Walk at the site, 635 North California Avenue La Puente, CA 91744 on **April 24, 2024, at 9:00 am**. Parking is available in the lot on the corner of Temple Avenue and California Avenue. Proposing Contractors are required to sign in at the job walk.

Project Documents will be available on or about **April 8, 2024**, from ARC (American Reprographics Co.), PH: 714-424-8525. To order project documents from ARC visit https://customer.e-arc.com/arcEOC/PWELL_Main.asp?mem=29, click on Public Plan room, & search by HACIENDA LA PUENTE USD in the dropdown list or call ARC & request the Planwell Department. Downloads are available at no charge. The hardcopy/paper or CD cost will be available with project information and is non-refundable. Any mailing costs are direct with ARC.

Total Contract time is 420 consecutive calendar days.
Estimated Construction Cost: $25,000,000
Contractor License Classification Required: A or B

The Board of Education reserves the right to reject all bids, and to waive any irregularity therein.

Dated:

BY ORDER OF THE BOARD OF EDUCATION
Manoj Roychowdhury
Associate Superintendent
Business Services
Hacienda La Puente Unified School District

Published in the San Gabriel Valley Tribune
Publish Dates: April 8, 2024 and April 15, 2024

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

BID: 2023-24.06R1

TEMPLE ACADEMY PERFORMING ARTS CENTER

SECTION 00 02 00
INFORMATION FOR BIDDERS

MANDATORY DOCUMENTS

THE FOLLOWING MUST BE SUBMITTED WITH BID

Bid Form
Bid Bond or Other Security
Designated Subcontractors List
Non-collusion Declaration
Project Warranty
Iran Contracting Act Certification
Ukraine-Russia Contracting Certification
Signed Letter of Assent (Acknowledging Continuity of Work Agreement)

INFORMATION FOR BIDDERS

1. Preparation and Availability of Bid Form

The DISTRICT invites Bids on the attached form to be submitted by GENERAL CONTRACTORS to the DISTRICT at such time and place as is stated in the Notice Inviting Bidders, not later than **May 28, 2024 at 2:00pm**. Bids shall only be prepared using the copy of the Bid Form included in the Contract Documents.

The use of substitute bid forms other than clear and correct photocopies of those provided by the DISTRICT will not be permitted. Bids shall be received in the Purchasing Office for the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, located at 15959 E. Gale Avenue, City of Industry, CA 91745. All blanks in the bid form must be appropriately filled in, and all prices must be stated in both words and figures. If a different price is stated in words than is stated in figures, the price stated in words shall be the price bid.

The DISTRICT may receive requests for the Contract Documents from plan rooms. Please note: Prospective Bidders who choose to review the Contract Documents at a plan room must contact the DISTRICT to obtain the required Contract Documents.

There will be a mandatory Job Walk at the Temple Academy site, 635 North California Avenue La Puente, CA 91744 on **April 24, 2024, at 9:00 am**. Parking is available in the lot on the corner of Temple Avenue and California Avenue.

QUESTIONS CONCERNING BID DOCUMENTS: Any questions pertaining to the bid documents are to be directed **via e-mail only** to the Project Manager of Cumming Group at robert.segarra@cumming-group.com and copy the DISTRICT Representative, Joel Duarte at jduarte@hlpusd.org no later than **May 24, 2024 at 3:00PM**. Questions recevied after this time may NOT be addressed.

Any changes, modifications, clarifications regarding the plans or the bid documents and/or instructions will be made via an addendum to the Bid and will be made available via the DISTRICT'S website at https://www.hlpschools.org/DISTRICT/business-services-division/purchasing-warehouse and/or from ARC (American Reprographics Co.), PH: 714-424-8525, FAX: 714-424-8526. To order documents from ARC visit https://customer.e-arc.com/arcEOC/PWELL_Main.asp?mem=29. The responsibility shall be on prospective Bidders to check both locations.

Bidders must complete and submit all of the following documents as its Bid:

Bid Form
Bid Bond or Other Security
Designated Subcontractors List
Non-collusion Declaration
Project Warranty
Iran Contracting Act Certification
Ukraine-Russia Contracting Certification
Signed Letter of Assent (Acknowledging Continuity of Work Agreement)

All other required documents must be provided before the Award of Contract.

2. Bid Security

Bids must be accompanied by a certified check, cashier's check, or Bidder's bond (executed by the Bidder as principal and surety as obligor), in the form and content attached hereto, for an amount not less than ten percent (10%) of the amount of the base bid, made payable to the order of the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT ("Bid Security") Personal sureties and unregistered surety companies are unacceptable. The surety insurer shall be California admitted surety insurer, as defined in Code of Civil Procedure Section 995.120. The surety insurer must, unless otherwise agreed to by DISTRICT in writing, at the time of issuance of the bond, have a rating not lower than "A-" as rated by A.M. Best Company, Inc., or other independent rating companies. The DISTRICT reserves the right to approve or reject the surety insurer selected by the CONTRACTOR and to require the CONTRACTOR to obtain a bond from a surety satisfactory to the DISTRICT.

The check or bid bond shall be given as a guarantee that the Bidder shall execute the Contract if it be awarded to the Bidder, shall provide the payment and performance bonds and insurance certificates and endorsements as required herein within ten (10) calendar days after notification of the award of the Contract to the Bidder. The DISTRICT may, at its sole discretion, give the respective Bidder a time extension to provide these required documents. Failure to provide the required documents may result in forfeiture of the Bidder's bid deposit or bond to the DISTRICT and the DISTRICT may award the Contract to the next lowest responsible Bidder or may call for new bids.

3. Faxed and Electronic Mail Bids

All bids must be under sealed cover. DISTRICT will not accept any bids or bid modifications submitted by facsimile or electronic mail transmission.

4. Signing of Bids

All Bids submitted shall be executed by the Bidder or its authorized representative. Bidders may be asked to provide evidence in the form of an authenticated resolution of its Board of Directors or a Power of Attorney evidencing the capacity of the person signing the Bid to bind the Bidder to each Bid and to any Contract arising therefrom.

If a Bidder is a joint venture or partnership, it may be asked to submit an authenticated Power of Attorney executed by each joint venturer or partner appointing and designating one of the joint venturers or partners as a management sponsor to execute the Bid on behalf of Bidder. Only that joint venturer or partner shall execute the Bid. The Power of Attorney shall also: (1) authorize that particular joint venturer or partner to act for and bind Bidder in all matters relating to the Bid; and (2) provide that each venturer or partner shall be jointly and severally liable for any and all of the duties and obligations of Bidder assumed under the Bid and under any Contract arising therefrom. The Bid shall be executed by the designated joint venturer or partner on behalf of the joint venture or partnership in its legal name.

5. Modifications

Each Bidder shall submit its Bid in strict conformity with the requirements of the Contract Documents. Unauthorized additions, modifications, revisions, conditions, limitations, exclusions, or provisions attached to a Bid may render it non-responsive and may cause its rejection. Bidders shall neither delete, modify, nor supplement the printed matter on the Bid Forms, nor make substitutions thereon. Oral, telephonic, and electronic modifications will not be considered, unless the Notice Inviting Bids authorizes the submission of electronic bids and modifications thereto and such modifications are made in accordance with the Notice Inviting Bids.

6. Erasures/Mutilation of Bid Documents

The Bid submitted must not contain any erasures, interlineations, or other corrections unless each such correction is suitably authenticated by affixing in the margin immediately opposite the correction the handwritten initial(s) or surname(s) of the person(s) signing the bid.

CONTRACTORS should not deface or mutilate the bid documents to the extent that they may not be usable for construction purposes. Bid documents obtained under deposit shall be returned within ten (10) days after bid opening.

7. Examination of Site and Contract Documents

Each Bidder shall visit the site(s) of the proposed work and fully acquaint itself with the conditions relating to the construction and labor so that it may fully understand the facilities, difficulties, and restrictions attending the execution of the work under the Contract. Bidders shall thoroughly examine and be familiar with the Drawings and Specifications. The failure or omission of any Bidder to receive or examine any Contract Documents, forms, instruments, addenda, or other documents or to visit the site(s) and acquaint itself with conditions there existing shall in no way relieve any Bidder from obligations with respect to its bid or to the Contract. The Bidder is responsible to obtain any geotechnical and/or soils report pertaining to the site of the work at Bidder's expense, if applicable. Although any such report does not operate as a warranty or guarantee of site conditions, the submission of a Bid shall be taken as prima facie evidence of compliance with all terms of this section.

Discrepancies in, and/or omissions from the Plans, Specifications or other Contract Documents or questions as to their meaning shall be immediately brought to the attention of the DISTRICT by submission of a written request for an interpretation or correction to the DISTRICT. Such submission, if any, must be sent to be directed **via e-mail only** to the Project Manager of Cumming Group at robert.segarra@cumming-group.com and copy the DISTRICT Representative, Joel Duarte at jduarte@hlpusd.org

Any interpretation of the Contract Documents will be made only by written addenda duly issued. The DISTRICT will not be responsible for any explanations or interpretations provided in any other manner. The responsibility shall be on the Bidder to contact the DISTRICT or check the website for addenda or notifications of addenda. No person is authorized to make any oral interpretation of any provision in the Contract Documents to any Bidder, and no Bidder should rely on any such oral interpretation.

Bids shall include complete compensation for all items that are noted in the Contract Documents as the responsibility of the CONTRACTOR.

7.1 Each Bidder, by making its bid, represents that it has read and understands the Contract and Contract Documents and any and all related reports and information. After executing the Agreement, no consideration will be given to any claim of misunderstanding of the documents.

7.2 Each Bidder, by making its bid, represents that it has visited the site(s), inspected the area of the work, and familiarized itself with the local conditions under which the work is to be performed, including sub-surface conditions, as appropriate. Such inspection shall specifically consider requirements for accessing the site and determining the work can be completed as required by, and as shown in, the Contract Documents.

7.3 With DISTRICT'S approval, including provision of insurance as required, and after scheduling access with the DISTRICT, each Bidder may conduct additional site investigations at the Bidder's sole cost.

8. Withdrawal of Bids

Prior to bid opening, a Bid may be withdrawn by the Bidder only by means of a written request to the Director of Purchasing and Warehouse signed by the Bidder or its properly authorized representative.

9. Agreements and Bonds

The Agreement form, which the successful Bidder, as CONTRACTOR, will be required to execute, and the forms and amounts of surety bonds, which will be required to furnish at the time of execution of the Agreement, are included in the Contract Documents and shall be carefully examined by the Bidder. The required number of executed copies of the Agreement, the Performance Bond, and the Payment Bond is as specified in the Special Conditions.

The Payment and Performance Bond must be executed by an admitted surety insurer approved to conduct business in the State of California which meets the highest standards the DISTRICT is legally permitted to establish and which it has established. The surety insurer must, unless otherwise agreed to by DISTRICT in writing, at the time of issuance of the bond, have a rating not lower than "A-" as rated by A.M. Best Company, Inc., or other independent rating companies. The DISTRICT reserves the right to approve or reject the surety insurer selected by the CONTRACTOR and to require the CONTRACTOR to obtain a bond from a surety satisfactory to the DISTRICT.

The Payment and Performance Bond must be in the amount of one hundred percent (100%) of the total amount payable. Bonds shall be in the form set forth in the Contract Documents.

10. Bidders Interested in More Than One Bid and Bidders Not Qualified to Bid

No person, firm, or corporation shall be allowed to make, or file, or be interested in more than one bid for the same work unless alternate bids are specifically called for. A person, firm, or corporation that has submitted a sub-proposal to a Bidder, or that has quoted prices of materials to a Bidder, is not thereby disqualified from submitting a sub-proposal or quoting prices to other Bidders or making a prime proposal. No person, firm, or corporation shall be allowed to bid who has participated in the preparation of contract specifications; a bid by such a person, firm, or corporation shall be determined to be nonresponsive.

11. Award of Contract

The Contract shall be awarded to the lowest responsible and responsive Bidder as interpreted by the DISTRICT under California law and the Contract Documents, including the Notice Inviting Bids and these Instructions. If multiple, "base bids" are requested the DISTRICT will award to the lowest in each category of "base bid", however, if a "base bid" option includes a combination other "base bids", the DISTRICT can award to the lowest combination "base bid" if it is in their best interest to do so. The DISTRICT reserves the right, without any liability, to cancel the award of any bid for any reason at any time before the full execution of the Agreement between DISTRICT and CONTRACTOR.

The DISTRICT reserves the right to reject any or all bids, or to waive any irregularities or informalities in any bid or in the bidding process.

12. Additive and Deductive Items - Method of Determining Basis of Award

Pursuant to Public Contract Code Section 20103.8, should this bid solicitation include additive and/or deductive items, the checked [X] method shall be used to determine the lowest bid:

___X___ (a) The lowest bid(s) shall be determined by the combination of the lowest total cost to the DISTRICT as determined by base bid(s), without consideration of the prices on the additive or deductive alternates.

_____ (b) The lowest bid shall be the lowest total of the bid prices on the base contract and those additive or deductive items taken in the numerical order set forth in the bid form.

_____ (c) The lowest bid shall be the lowest total of the bid prices on the base contract and those additive or deductive items taken in order from a specifically identified list of those items that, when in the bid form and added to, or subtracted from, the base contract, are less than, or equal to, a funding amount publicly disclosed by the DISTRICT before the first bid is opened.

_____ (d) The lowest bid shall be determined in a manner that prevents any information that would identify any of the Bidders from being revealed to the public entity before the ranking of all Bidders from lowest to highest has been determined.

If no method is checked, sub-paragraph (a) shall be used to determine the lowest bid.

Notwithstanding the method used by the DISTRICT to determine the lowest responsible Bidder, the DISTRICT retains the right to add to or deduct from the Contract any of the additive or deductive items included in the bid solicitation.

13. Evidence of Responsibility

Upon the request of the DISTRICT, a Bidder whose bid is under consideration for the award of the Contract shall submit promptly to the DISTRICT satisfactory evidence showing the Bidder's financial resources, the Bidder's construction experience in the type of work being required by the DISTRICT, and the Bidder's organization available for the performance of the Contract and any other required evidence of the Bidder's qualifications to perform the Contract.

14. Listing Subcontractors

Each Bidder shall submit in its bid a list of the proposed subcontractors on this project as required by the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 et seq.). CONTRACTOR shall provide the address, phone number, and license number of each listed subcontractor. Forms for this purpose are furnished with the Contract Documents.

15. Workers' Compensation

In accordance with the provisions of Section 3700 of the Labor Code, CONTRACTOR shall secure the payment of compensation to its employees. CONTRACTOR shall sign and file with DISTRICT the following certificate prior to performing the work under this Contract:

I am aware of the provisions of section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

The form of such certificate is included as part of the Contract Documents.

16. Insurance Requirements

The successful Bidder shall procure the insurance in the form and in the amount specified in the Contract/Bid Documents.

17. Contractor's License and Certifications

Pursuant to Section 7028.15 of the Business and Professions Code and Section 3300 of the Public Contract Code, all Bidders must possess proper licenses for performance of this Contract prior to submittal of bid documents. Subcontractors must possess the appropriate licenses for each specialty subcontracted prior to submittal of bid documents. Pursuant to Section 7028.5 of the Business and Professions Code, the DISTRICT shall consider any bid submitted by a CONTRACTOR not currently licensed in accordance with state law and pursuant to the requirements found in the Contract Documents to be non-responsive, and the DISTRICT shall reject the Bid. The DISTRICT shall have the right to request, and Bidders shall provide within five (5) calendar days, evidence satisfactory to the DISTRICT of all valid license(s) currently held by that Bidder and each of the Bidder's subcontractors, before awarding the Contract.

18. Ethics in Bidding

The DISTRICT expects the Bidders to maintain high ethical standards in engaging in the competitive bidding process. The bid amount of one Bidder should not be divulged to another before the award of the subcontract or order, nor should it be used by CONTRACTOR to secure a lower proposal from another Bidder on that project (bid shopping). Subcontractors or suppliers should not request information from the CONTRACTOR regarding any sub-bid in order to submit a lower proposal on that project (bid peddling).

19. Substitutions and Special Brand Names

In accordance with Public Contract Code Section 3400, except where the DISTRICT has established a standard that has been approved by the Governing Board, requests for review and evaluation of "or equal" items will be considered. After reviewing the request, the DISTRICT will respond with its decision to all parties who have received bid packages. The DISTRICT has the right to reject any or all requests for substitutions of equipment, materials, products, things, or services other than what is specified in the bid documents if the DISTRICT determines that such substitutions are not equal to the equipment, materials, products, things, or services set forth in the Bid. The documentation submitted must include any and all illustrations, specifications, and other relevant data including catalogue information which describes the substituted item or product or work and substantiates that it is an "equal" to the specified item or product or work. In addition, the submittal documentation must also include a statement of the cost implications of the substitution being requested stating whether and why the substitution will reduce or increase the contract price. The documentation submitted must also include information regarding the durability and life cycle cost of the substituted item, product, or work. Substantiating data shall include a signed affidavit from the Bidder stating that the substituted item or product or work is equivalent to the specified item or product or work in every way except as listed on the affidavit. Whenever possible, the same substitution information is to be included in the sealed bid submittal package. Failure to submit

all the needed substantiating data, including the signed affidavit, may result in a determination that the bid is nonresponsive.

IF A PROPOSED SUBSTITUTION IS REJECTED, BIDDER SHALL BE RESPONSIBLE FOR PROVIDING THE ITEM OR PRODUCT OR WORK AS ORIGINALLY SPECIFIED AT NO ADDITIONAL COST TO THE DISTRICT. THE DISTRICT HAS THE COMPLETE AND SOLE DISCRETION TO DETERMINE IF AN ITEM OR ARTICLE IS AN EQUAL ITEM.

20. Fingerprinting

By law it is the DISTRICT'S responsibility to determine whether a CONTRACTOR must provide fingerprint certification. Pursuant to Education Code Section 45125.2, the DISTRICT considers the totality of the circumstances in order to determine if fingerprinting of employees of a CONTRACTOR working on a school site is required. Factors to be considered include the length of time the CONTRACTOR'S employees are on school grounds, whether students are in proximity with the location where the CONTRACTOR'S employees are working, and whether the CONTRACTOR'S employees are working alone or with others. A determination regarding whether fingerprint certification is required is contained in the Special Conditions.

21. Retention

Public agencies generally cannot withhold more than five percent (5%) of the amount to be paid to a CONTRACTOR for work to be completed unless the project is "substantially complex." The Project will use a five percent (5%) retention.

22. Contractor/Subcontractor Registration and Labor Compliance Monitoring and Enforcement

Except as provided in Labor Code Section 1771.1(a), no CONTRACTOR or Subcontractor may be listed on a bid proposal for a public works project or perform work on a public works contract unless registered with the Department of Industrial Relations pursuant to California Labor Code Section 1725.5. This Project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

CONTRACTOR and any Subcontractors engaging in work on the Project are required to review and comply with the provisions of the California Labor Code, Division 2, Part 7, Chapter 1, beginning with Section 1720, and the regulations of the Department of Industrial Relations implementing those provisions. These statutory and regulatory provisions contain specific requirements concerning, for example, the determination and payment of prevailing wages, retention, inspection and auditing of payroll records, use of apprentices, payment of overtime compensation, and various penalties or fines which may be imposed for violations of the requirements of the chapter. Submission of a bid proposal constitutes the Bidder's representation that it has thoroughly reviewed these statutory and regulatory requirements and agrees to bind every Subcontractor performing work on the Project to these requirements to the extent such requirements are applicable to the Subcontractor's work.

23. Disabled Veteran Business, Women & Minority Owned Enterprises

Compliance with Disabled Veteran Business Enterprise ("DVBE") contracting goals is not required for this project. However, minority, women and disabled veteran contractors are highly encouraged to submit bids on this project, both as general and/or subcontractors. The District aspires for maximum participation and opportunity for these business entities.

24. Immigration Reform and Control Act

The Bidder hereby certifies that he or she or it is, and at all times during the performance of work hereunder shall be, in full compliance with the provisions of the Immigration Reform and Control Act of 1986 ("IRCA") in the hiring of its employees and the Bidder shall indemnify, hold harmless and defend the DISTRICT against any and all actions, proceedings, penalties or claims arising out of the Bidder's failure to comply strictly with the IRCA.

25. Filing of Bid Protests

A Bidder may protest the bidding process for the project only by filing a written protest with the Director of Purchasing and Warehouse in accordance with the procedures set forth in this section. The DISTRICT will not consider any verbal protests (e.g., by telephone). All protests must be submitted in writing to the DISTRICT by either e-mail, facsimile, or personal delivery. In order for a protest to be valid and considered by the DISTRICT, the protest must: (a) be filed not later than seventy-two (72) hours after the end of the bid opening; (b) clearly identify the Bidder on whose behalf the protest is being filed, together with the name, address and telephone number of the person representing the Bidder for purposes of the protest; (c) clearly identify the specific bidding process, bid or award of the Contract being protested; (d) clearly identify and describe in detail the specific basis or bases for the protest and all facts relevant thereto and in support thereof; (e) clearly identify all references to the specific portions of all documents relevant to the protest; (f) clearly identify and describe in detail all arguments in support of the protest, including, without limitation, any citations to all legal authorities; (g) be submitted with all documentation that is relevant to and supports the basis or bases underlying the protest; and with a copy to the Bidder whose bid is being protested.

If a protest filed by a Bidder does not comply with each and every one of the foregoing requirements, the DISTRICT may reject the protest as invalid. If a Bidder files a valid protest, the DISTRICT shall review the protest and all relevant information and documents and will provide written decision to the protesting Bidder. In response to a protest, the DISTRICT may decline to award a contract, may award a contract to a Bidder other than as previously intended, or may award a contract to a Bidder as previously intended despite the protest. Such action by the DISTRICT shall be a condition precedent to the filing of any claim or demand and to the initiation of any action (legal or equitable) or other proceeding arising from the matter(s) protested.

COMPLIANCE WITH THE FOREGOING REQUIREMENTS IS MANDATORY. Each Bidder that desires to protest must file a protest in accordance with the foregoing requirements, and no Bidder may rely on a protest by another Bidder as a means of satisfying such requirements. Compliance with the foregoing requirements is the sole and exclusive means of protesting the bidding process, any bid, and/or the intended award of a contract for the project, and failure to so comply shall be deemed and construed as a waiver of any and all rights the Bidder may have to pursue a claim, demand or action based on the bidding, any bids, and/or any contract awarded for the project.

26. Addendum

The DISTRICT reserves the right to revise the Contract Documents prior to the bid opening date. Revisions, if any, shall be made by written addendum. All addenda issued by the DISTRICT shall be included in the bid and made part of the Contract Documents. Pursuant to Public Contract Code Section 4104.5, if the DISTRICT issues an addendum which includes material changes to the Project less than 72 hours prior to the deadline for submission of bids, the DISTRICT will extend the deadline for submission of bids. The DISTRICT may determine, in its sole discretion, whether an addendum warrants postponement of the bid submission date.

Please note: Bidders are responsible for ensuring that they have received any and all addenda. To this end, each Bidder should contact **via e-mail only** the Project Manager of Cumming Group at robert.segarra@cumming-group.com and copy the DISTRICT Representative, Joel Duarte at jduarte@hlpusd.org to verify that he/she has received all Addenda issued, if any, prior to the bid opening.

27. Submission of Sealed Bids

Once the Bid and supporting documents have been completed and signed as set forth herein, they shall be placed, along with the Bid Guarantee and other required materials in an envelope, sealed, addressed, and delivered or mailed, postage prepaid to the DISTRICT at the place and to the attention of the person indicated in the Notice Inviting Bids. No oral or telephonic bids will be considered. No forms transmitted via the internet, e-mail, facsimile, or any other electronic means will be considered unless specifically authorized by DISTRICT as provided herein. The envelope shall also contain the following in the lower left-hand corner thereof:

BID: 2023-24.06R1
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Only where expressly permitted in the Notice Inviting Bids may Bidders submit their bids via electronic transmission pursuant to Public Contract Code Sections 1600 and 1601. The acceptable method(s) of electronic transmission shall be stated in the Notice Inviting Bids. DISTRICT reserves the right to not accept electronically transmitted bids, where not specifically authorized in the Notice Inviting Bids, and may reject any bid not strictly complying with DISTRICT'S designated methods for delivery.

28. Delivery and Opening of Bids

Bids will be received by the DISTRICT at the address shown in the Notice Inviting Bids up to but **not later than May 28, 2024, at 2:00 pm**. The official time shall be kept in the DISTRICT'S Purchasing Director's Office. The DISTRICT will leave unopened any Bid received after the specified date and time, and any such unopened Bid will be returned to the Bidder. It is the Bidder's sole responsibility to ensure that its Bid is received as specified. Bids may be submitted earlier than the dates(s) and time(s) indicated.

Bids will be opened immediately following the date and time set for receipt and the amount of each Bid will be read aloud and recorded. All Bidders may, if they desire, attend the opening of Bids. The DISTRICT may in its sole discretion, elect to postpone the opening of the submitted Bids. DISTRICT reserves the right to reject any or all Bids and to waive any informality or irregularity in any Bid. In the event of a discrepancy between the written amount of the Bid Price and the numerical amount of the Bid Price, the written amount shall govern.

29. Prevailing Wage

The Project is a public works project subject to prevailing wage requirements. The general prevailing rate of per diem wages in the locality in which this work is to be performed for each craft or type of worker needed to execute the Contract may be obtained online at http://www.dir.ca.gov/dlsr. Bidders are advised that a copy of these rates must be posted by the successful Bidder at the job site(s).

30. Debarment of Contractors and Subcontractors

In accordance with the provisions of the Labor Code, CONTRACTORS or subcontractors may not perform work on a public works project with a subcontractor who is ineligible to perform work on a public project pursuant to Labor Code Sections 1777.1 or 1777.7. Any contract on a public works project entered into between a CONTRACTOR and a debarred subcontractor is void as a matter of law. A debarred subcontractor may not receive any public money for performing work as a subcontractor on a public works contract. Any public money that is paid to a debarred subcontractor by the CONTRACTOR for the Project shall be returned to the DISTRICT. The CONTRACTOR shall be responsible for the payment of wages to workers of a debarred subcontractor who has been allowed to work on the Project.

31. Sales and Other Applicable Taxes, Permits, and Fees

CONTRACTOR and its subcontractors performing work under this Contract will be required to pay California sales tax and other applicable taxes, and to pay for permits, licenses and fees required by the agencies with authority in the jurisdiction in which the work will be located, unless otherwise expressly provided by the Contract Documents.

32. Anti-Discrimination

It is the policy of the DISTRICT that there be no discrimination against any prospective or active employee engaged in the Work because of race, color, ancestry, national origin, religious creed, sex, age or marital status, pregnancy, physical or mental disability, physical or mental medical condition, veteran status, gender, or sexual orientation. All Bidders agree to comply with the DISTRICT'S anti-discrimination policy and all applicable Federal and California anti-discrimination laws including but not limited to the California Fair Employment & Housing Act beginning with California Government Code § 12940 et seq. and California Labor Code § 1735. In addition, all Bidders agree to require like compliance by any Subcontractor employed by them on the work on the Contract.

33. Public Records

All documents included in the bids become the exclusive property of the DISTRICT upon submittal to the DISTRICT. All Bids and other documents submitted in response to the Notice Inviting Bidders becomes a matter of public record, except for information contained in such bids deemed to be trade secrets, as defined in California Civil Code Section 3426.1. A Bidder that indiscriminately marks all or most of its Bid as exempt from disclosure as a public record, whether by the notations of "Trade Secret," "Confidential," "Proprietary," or otherwise, may render the Bid non-responsive and rejected. The DISTRICT is not liable or responsible for the disclosure of such records, including those exempt from disclosure if disclosure is deemed required by law by an order of court, or which occurs through inadvertence, mistake, or negligence on the part of the DISTRICT or its officers, employees, or agents. At such time as Bids are deemed a matter of public record, pursuant to the above, any Bidder or other party shall be afforded access for inspection and/or copying of such bids, by request made to the DISTRICT in conformity with the California Public Records Act, Government Code § 6250 et seq.

34. Drug-Free Workplace Certification

In accordance with the Drug Free Workplace Act of 1990 and California Government Code § 8350 et seq., the successful Bidder will be required to execute a Drug-Free Workplace Certification concurrently with execution of the Agreement. The successful Bidder will be required to implement and take the affirmative measures outlined in such provisions. Failure of the successful Bidder to comply with the measures outlined in such provisions may result

in penalties, including without limitation, the termination of the Agreement, the suspension of any payment of the Contract Price otherwise due under the Contract Documents and/or debarment of the successful Bidder.

35. Early Termination

Notwithstanding any provision herein to the contrary, if for any fiscal year of this Contract the Governing Board of the DISTRICT fails to appropriate or allocate funds for future periodic payments under the Contract after exercising reasonable efforts to do so, the DISTRICT may, upon thirty (30) days' notice, order work on the Project to cease. The DISTRICT will remain obligated to pay for the work already performed but shall not be obligated to pay the balance remaining unpaid beyond the fiscal period for which funds have been appropriated or allocated and for which the work has not been done.

END OF SECTION

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

BID: 2023-24.06R1

TEMPLE ACADEMY PERFORMING ARTS CENTER

SECTION 00 03 00
CONTRACT BID FORMS

BID FORM AND PROPOSAL

To: Governing Board of the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT ("DISTRICT")

From: _____
(Insert Proper Name of Bidder)

BID: 2023-24.06R1
TEMPLE ACADEMY PERFORMING ARTS CENTER

The undersigned declares that the Contract Documents including, without limitation, the Notice Inviting Bids and the Information for Bidders have been read and agrees and proposes to furnish all necessary labor, materials, and equipment to perform and furnish all work in accordance with the terms and conditions of the Contract Documents, including, without limitation, the Drawings and Specifications of the Bid: Temple Academy Performing Arts Center ("Project" or "Contract") and will accept in full payment for that Work the following total lump sum amount, all taxes included:
All cash allowances shall be included in the combined total price for each of the respective base bids.

BASE BID:

Temple Academy Performing Arts Center. Total lump sum cost shall include all scope items as defined within the drawings, specifications, phasing plans, and schedules.

CASH ALLOWANCE IN BASE BID: $2,500,000 (allowance amount must be included in the Base Bid below): _____DOLLARS

($_____), including all applicable taxes, permits and licenses.

ADDITIVE/DEDUCTIVE ALTERNATES:

ADDITIVE ALTERNATE #1, Armed Security Guard

Provide One Armed Security Guard with patrol car from 5pm to 5am 7 days a week at Temple Academy. Provide cost on per month basis. If this Additive Alternate is awarded the District, in their sole discretion, shall make the determination as to when these services shall begin and end. If the services are requested for a portion of a month the District shall only pay that pro rata amount.

Add Alternate 1: $_____ per month.

_____DOLLARS,
including all applicable taxes, permits, and licenses.

ADDITIVE ALTERNATE #2, Electrical Repairs on Existing Buildings

Include all the electrical, demo and related scope of work per CCD-001 drawings.

Add Alternate 2: $_____.

_____DOLLARS,
including all applicable taxes, permits, and licenses.

1. The undersigned has reviewed the Work outlined in the Contract Documents and fully understands the scope of Work required in this Proposal, understands the construction and project management function(s) described in the Contract Documents, and that each Bidder who is awarded a Contract shall be in fact a prime CONTRACTOR, not a subcontractor, to the DISTRICT, and agrees that its Proposal, if accepted by the DISTRICT, will be the basis for the Bidder to enter into a Contract with the DISTRICT in accordance with the intent of the Contract Documents.

2. The undersigned has notified the DISTRICT in writing of any discrepancies or omissions or of any doubt, questions, or ambiguities about the meaning of any of the Contract Documents and has contacted the DISTRICT before the bid opening date to verify the issuance of any clarifying Addenda.

3. The undersigned agrees to commence work under this Contract on the date established in the Contract Documents and to complete all work within the time specified in the Contract Documents.

4. The liquidated damages clause of the General Conditions and Special Conditions is hereby acknowledged.

5. It is understood that the DISTRICT reserves the right to reject this bid and that the bid shall remain open to acceptance and is irrevocable for a period of ninety (90) days.

6. The following documents are attached hereto to this bid form:

   Bid Bond on the District's form or other security

   Designated Subcontractors List

   Non-Collusion Declaration

   Project Warranty

   Iran Contracting Act Certification

   Ukraine-Russia Contracting Certification

   Prime Contractor Letter of Assent (acknowledging Continuity of Work Agreement, if required by Special Conditions)

7. Receipt and acceptance of the following Addenda is hereby acknowledged (copy and add as needed if additional addenda issued):

Addendum No. 1 _____	Dated: _____	Addendum No.2 _____	Dated: _____
Addendum No. 3 _____	Dated: _____	Addendum No.4 _____	Dated: _____
Addendum No. 5 _____	Dated: _____	Addendum No.6 _____	Dated: _____

   The Bidder represents that it is competent, knowledgeable, and has special skills with respect to the nature, extent, and inherent conditions of the Work to be performed.

8. Bidder expressly acknowledges that it is aware that if a false claim is knowingly submitted (as the terms "claim" and "knowingly" are defined in the California False Claims Act, Cal. Gov. Code, §12650 et seq.), the DISTRICT will be entitled to civil remedies set forth in the California False Claim Act. It may also be considered fraud and the CONTRACTOR may be subject to criminal prosecution.

9. The undersigned Bidder certifies that it is, at the time of bidding, and shall be throughout the period of the contract, licensed by the State of California to do the type of work required under the terms of the Contract Documents. Bidder further certifies that it is regularly engaged in the general class and type of work called for in the Contract Documents.

[Remainder of Page Intentionally Left Blank]

Furthermore, Bidder hereby certifies to the DISTRICT that all representations, certifications, and statements made by Bidder, as set forth in this bid form, are true and correct and are made under penalty of perjury.

Dated this _____ day of _____ 20___

Name of Bidder_____

_____

Type of Organization _____

Signature _____

Signed by _____

Title of Signer _____

Address of Bidder _____

Bidder's Taxpayer Identification No. _____

Telephone Number _____

Fax Number _____

E-mail _____ Website _____

CONTRACTOR'S License No(s).: No.: _____ Class:_____

Expiration Date:

No.: _____ Class:_____ Expiration Date: _____
No.: _____ Class:_____ Expiration Date: _____

If Bidder is a corporation, affix corporate seal.

Name of Corporation: _____

President: _____

Secretary:_____

Treasurer: _____

Manager: _____

BID BOND

WHEREAS, _____, as PRINCIPAL, and _____, as SURETY, a corporation organized and existing under and by virtue of the laws of the State of _____ and authorized to do business as a SURETY in the State of California, are held and firmly bound unto the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT ("DISTRICT"), as OBLIGEE, in the sum of _____ **DOLLARS ($_____)**, being not less than ten percent (10%) of the Total Bid Price; for the payment of which sum will and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said PRINCIPAL has submitted a bid to the DISTRICT to perform all Work required for the **TEMPLE ACADEMY PERFORMING ARTS CENTER, Bid 2023-24.06R1**, as set forth in the Notice Inviting Bidders and accompanying Contract Documents.

NOW, THEREFORE, if said PRINCIPAL is awarded a Contract for the Work by the DISTRICT and, within the time and in the manner required by the above-referenced Contract Documents, enters into the written form of Contract bound with said Contract Documents, furnishes the required bonds (one to guarantee faithful performance and the other to guarantee payment for labor and materials), furnishes the required insurance certificates and endorsements, and furnishes any other certifications as may be required by the Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

SURETY, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or the notice inviting bids, or to the work to be performed thereunder, or the specifications accompanying the same, shall in any way affect its obligation under this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract of the Notice Inviting Bidders, or to the work, or to the specifications.

The bid security will be held by the DISTRICT for ten (10) days after the period for which bids must be held open or until posting by the successful Bidder(s) of the bonds, certificates of insurance required, and return of executed copies of the Agreement, whichever first occurs, at which time the bid security will be returned.

In the event suit is brought upon this bond by the DISTRICT and judgment is recovered, said SURETY shall pay all costs incurred by the DISTRICT in such suit, including reasonable attorneys' fees to be fixed by the court.

SIGNED AND SEALED, this _____ day of _____, 20___.

_____	_____
PRINCIPAL	SURETY
By: _____	By: _____
Signature	Signature
(SEAL)	(SEAL)

DESIGNATED SUBCONTRACTORS LIST

In compliance with the "Subletting and Subcontracting Fair Practices Act," California Public Contract Code Sections 4100 to 4114, and any amendments thereto, each Bidder shall provide the information requested below for each subcontractor who will perform work, labor or render service to Bidder in or about the construction of the Work in an amount in excess of one-half of one percent (greater than 0.5 %) of the Bidder's Total Bid Price and shall further set forth the portion of the Work which will be done by each subcontractor. Bidder shall list only one subcontractor for any one portion of the Work.

If the Bidder fails to specify a subcontractor for any portion of the Work to be performed under the Contract, it shall be deemed to have agreed to perform such portion itself and shall not be permitted to subcontract that portion of the Work except under the conditions hereinafter set forth below.

Subletting or subcontracting of any portion of the Work in excess of one half of one percent (greater than 0.5%) of the Total Bid Price for which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, and then only after DISTRICT approval.

Name and Location of Subcontractor — Description of Work to be Subcontracted

Name: _____ _____

Address: _____ _____

Ph: _____ License No. _____

DIR Registration No.: _____

Name and Location of Subcontractor — Description of Work to be Subcontracted

Name: _____ _____

Address: _____ _____

Ph: _____ License No. _____

DIR Registration No.: _____

Name and Location of Subcontractor — Description of Work to be Subcontracted

Name: _____ _____

Address: _____ _____

Ph: _____ License No. _____

DIR Registration No.: _____

Name and Location of Subcontractor | Description of Work to be Subcontracted

Name: _____ _____

Address: _____ _____

Ph: _____ License No. _____

DIR Registration No.: _____

Name and Location of Subcontractor | Description of Work to be Subcontracted

Name: _____ _____

Address: _____ _____

Ph: _____ License No. _____

DIR Registration No.: _____

Name and Location of Subcontractor | Description of Work to be Subcontracted

Name: _____ _____

Address: _____ _____

Ph: _____ License No. _____

DIR Registration No.: _____

Name and Location of Subcontractor | Description of Work to be Subcontracted

Name: _____ _____

Address: _____ _____

Ph: _____ License No. _____

DIR Registration No.: _____

NON-COLLUSION DECLARATION

In accordance with Public Contract Code Section 7106, the undersigned declares that he or she holds the position listed below with the Bidder, the party making the foregoing bid, that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the Bidder or any other Bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other Bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the Bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a Bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the Bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

_____
Signature

_____
Typed or Printed Name

_____
Title

_____
Bidder

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

Subscribed and sworn before me [Seal]

This _____ day of _____, 20___

_____
Notary Public in and for
the State of California

PROJECT WARRANTY

We, the undersigned, do hereby warrant and guarantee all products and services described within which we will provide for:

BID: 2023-24.06R1
TEMPLE ACADEMY PERFORMING ARTS CENTER

all will be in accordance with the Contract Documents and that all such Work as installed will fulfill or exceed all minimum warranty requirements. We agree to repair or replace Work installed by us for a period of at least **two (2) years** after the date of recording the Notice of Completion, together with any adjacent Work which is displaced or damaged by so doing, that proves to be defective in workmanship, material, or function at no expense to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, ordinary wear and tear and unusual abuse or neglect excepted. Manufacturers and suppliers' warranties may be longer than the two (2) year period described above, but not shorter.

In the event of our failure to comply with the above-mentioned conditions within seven (7) business days, after notification in writing, we, the undersigned, all collectively and separately, hereby authorize the DISTRICT to have said defective Work, repaired or replaced to be made good, and agree to pay to the DISTRICT upon demand all moneys that the DISTRICT may expend in making good said defective Work, including all collection costs and reasonable attorneys' fees.

Company Name: _____

Signed: _____
(CONTRACTOR'S signature)

Name: _____
(typed or printed)

Date: _____

IRAN CONTRACTING ACT CERTIFICATION

Pursuant to Public Contract Code (PCC) Section 2204, an Iran Contracting Act certification is required for solicitations of goods or services of one million dollars ($1,000,000) or more.

Bidder shall complete **ONLY ONE** of the following three paragraphs.

☐ 1. Bidder's Total Base Bid is less than one million dollars ($1,000,000).

OR

☐ 2. Bidder's Total Base Bid is one million dollars ($1,000,000) or more, but Bidder is **not** on the current list of persons engaged in investment activities in Iran created by the California Department of General Services ("DGS") pursuant to Public Contract Code § 2203(b), and Bidder is not a financial institution extending twenty million dollars ($20,000,000) or more in credit to another person, for 45 days or more, if that other person will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS.

OR

☐ 3. Bidder's Total Base Bid is one million dollars ($1,000,000) or more, but the DISTRICT has given prior written permission to Bidder to submit a proposal pursuant to PCC 2203(c) or (d). **A copy of the written permission from the DISTRICT is included with Bid**.

I certify that I am duly authorized to legally bind the Bidder to this certification, that the contents of this certification are true, and that this certification is made under the laws of the State of California.

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

UKRAINE-RUSSIA CONTRACTING CERTIFICATION

On February 21, 2022, President Biden issued Executive Order 14065 ("Federal Order") imposing economic sanctions and prohibiting many activities including, but not limited to, investing, importing, exporting, and contracting, in areas of Ukraine and in Russia. On March 4, 2022, California Governor Newsom issued Order N-6-22 requiring state agencies to take steps to ensure any agency and entity under contract with state agencies comply with the Federal Order ("State Order").

If awarded a contract with the DISTRICT, your Firm must comply with the economic sanctions imposed in response to Russia's actions in Ukraine, including the orders and sanctions identified on the U.S. Department of the Treasury website: (https://home.treasury.gov/policy-issues/financial-sanctions/sanctions-programs-and-country-information/ukraine-russia-related-sanctions).

As part of this procurement, this Certification shall be part of your Response:

(1) Confirmation that your Firm is in compliance with the required economic sanctions of the Federal and State Orders; and

(2) Confirmation that your Firm will take the steps necessary in response to Russia's actions in Ukraine, including, but not limited to, desisting from making new investments in, or engaging in financial transactions with, Russian entities, not transferring technology to Russia or Russian entities, and directly providing support to the government and people of Ukraine. Upon DISTRICT request, your firm will provide the DISTRICT a written statement detailing your actions related to this Section.

Executive Order 14065:
https://www.whitehouse.gov/briefing-room/presidential-actions/2022/02/21/executive-order-on- blocking-property-of-certain-persons-and-prohibiting-certain-transactions-with-respect-to-continued-russian-efforts-to-undermine-the-sovereignty-and-territorial-integrity-of-ukraine/

State Order N-6-22:
https://www.gov.ca.gov/wp-content/uploads/2022/03/3.4.22-Russia-Ukraine-Executive-Order

I certify that I am duly authorized to legally bind the Bidder to this certification, that the contents of this certification are true, and that this certification is made under the laws of the State of California.

Company Name: _____

Signed: _____
(CONTRACTOR'S signature)

Name: _____
(typed or printed)

Date: _____

LETTER OF ASSENT

[TO BE SIGNED BY ALL CONTRACTORS AND SUBCONTRACTORS AWARDED WORK COVERED BY THE CONTINUITY OF WORK AGREEMENT PRIOR TO COMMENCING WORK ON ANY PROJECT]

[CONTRACTOR'S LETTERHEAD]

Project Labor Coordinator
c/o Hacienda La Puente Unified School District
15959 East Gale Avenue
City of Industry, California 91745
Attn: Joel Duarte

Re: Letter of Assent – Continuity of Work Agreement

Dear Sir:

This is to confirm that _____ ("Company") agrees to be party to and bound by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Continuity of Work Agreement effective April 1, 2019, as such Agreement may, from time to time, be amended by the negotiating parties or interpreted pursuant to its terms. Such obligation to be a party and bound by this Agreement shall extend to all work covered by the agreement undertaken by this Company on the project and this Company shall require all of its CONTRACTORS and subcontractors of whatever tier to be similarly bound for all work within the scope of the Agreement by signing and furnishing to you an identical letter of assent prior to their commencement of work.

Sincerely,

[Name of Construction Company]

By: [_____] Name and Title of Authorized Executive

[Copies of this letter must be submitted to the DISTRICT Coordinator and to the Council Consistent with Article II. Section 2.5(b).]

END OF DOCUMENT

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

BID: 2023-24.06R1

TEMPLE ACADEMY PERFORMING ARTS CENTER

SECTION 00 04 00
AGREEMENT

AGREEMENT

THIS AGREEMENT is made this ___ day of _____ in the County of _____, State of California, by and between the **HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT** (the "DISTRICT") and _____ (the "CONTRACTOR"). The DISTRICT and CONTRACTOR may be referred to herein individually as a "Party" and collectively as the "Parties."

RECITALS

A. DISTRICT is contracting for Bid Bundle: **Temple Academy Center Performing Arts Center, Bid: 2023-24.06R1**

B. CONTRACTOR has been selected as the lowest responsible and responsive bidder for the Project.

C. DISTRICT desires that the CONTRACTOR complete the Project in accordance with the terms and conditions set forth in this Agreement and all Contract Documents incorporated herein.

NOW, THEREFORE, in consideration of the mutual agreements and covenants contained in this Agreement, and other valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

ARTICLE 1 - SCOPE OF WORK. The CONTRACTOR shall perform within the time stipulated the contract as herein defined, and shall provide all labor, materials, tools, utility services, and transportation to complete in a workmanlike manner all of the work required in connection with the following titled project:

BID: 2023-24.06R1
TEMPLE ACADEMY PERFORMING ARTS CENTER

in strict compliance with the Contract Documents as specified in Article 4 below, which shall be free from any and all liens and claims from mechanics, material suppliers, subcontractors, artisans, machinists, teamsters, freight carriers, and laborers required for the Project.

ARTICLE 2 - TIME FOR COMPLETION. The CONTRACTOR shall mobilize and commence work on the Project at the direction of DISTRICT staff. Time is of the essence for this Contract and the CONTRACTOR shall complete the Project within the period specified in the Special Conditions and in accordance with the schedule for the Project developed by the DISTRICT and the Construction Manager, if applicable. Any additional projects will be coordinated between the DISTRICT and CONTRACTOR. In entering into this Agreement, CONTRACTOR acknowledges and agrees that the duration stipulated herein is adequate and reasonable for the size and scope of the Project.

ARTICLE 3 - CONTRACT PRICE. The DISTRICT shall pay to the CONTRACTOR as full consideration for the faithful performance of the Contract an amount of **$**_____. Payment and performance bonds are to be issued each in the amount of one hundred percent (100%) of the total amount payment under the Contract. CONTRACTOR shall adjust the payment and performance bonds if outstanding work exceeds the original amount of the bonds.

The Contract Price is subject to increases or decreases as provided in the Contract Documents. The DISTRICT shall pay the Contract Price to the CONTRACTOR in accordance with the General Conditions.

ARTICLE 4 - COMPONENT PARTS OF THE CONTRACT. The Contract entered into by this Agreement consists of the following Contract Documents, all of which are component parts of the Contract as if herein set out in full or attached hereto:

Notice Inviting Bidders
Information for Bidders
Bid Form and Proposal, as accepted
Bid Bond
Designated Subcontractors List
Non-Collusion Declaration
Project Warranty
Iran Contracting Certification
Ukraine-Russia Contracting Certification
Letter of Assent
Agreement
Workers' Compensation Certification
Performance Bond
Payment Bond
Contractor Fingerprinting Certification
Asbestos-Free Materials Certification
Drug-Free Workplace Certification
Bidder's Acknowledgement of Project Schedule
Certificate Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion
General Conditions
Special Conditions
Drawings and Specifications
Addenda Nos. _____, _____, _____, _____, _____, as issued

All of the above-named Contract Documents are intended to be complementary. Work required by one of the above-named Contract Documents and not by others shall be done as if required by all. This Agreement shall supersede any prior agreement of the Parties.

ARTICLE 5 – CONTRACTOR'S LICENSE. The CONTRACTOR must possess throughout the Project the legally required CONTRACTOR'S license classification for this Project, issued by the State of California, which must be current and in good standing.

ARTICLE 6 – ENTIRE AGREEMENT. The Contract, which consists of all of the documents listed in Article 4 above, constitutes the entire agreement between the Parties relating to the Project, and supersedes any prior or contemporaneous agreement between the Parties, oral or written, including the DISTRICT's award of the Project to CONTRACTOR, unless such agreement is expressly incorporated herein. The DISTRICT makes no representations or warranties, express or implied, not specified in the Contract. The Contract is intended as the complete and exclusive statement of the Parties' agreement pursuant to Code of Civil Procedure section 1856.

ARTICLE 7 – EXECUTION OF OTHER DOCUMENTS. The Parties to this Agreement shall cooperate fully in the execution of any and all other documents and in the completion of any additional actions that may be necessary or appropriate to give full force and effect to the terms and intent of the Contract.

ARTICLE 8 – EXECUTION IN COUNTERPARTS. This Agreement may be executed in counterparts such that the signatures may appear on separate signature pages. A copy, or an original, with all signatures appended together, shall be deemed a fully executed Agreement.

ARTICLE 9 – BINDING EFFECT. CONTRACTOR, by execution of this Agreement, acknowledges that CONTRACTOR has read this Agreement and the other Contract Documents, understands them, and agrees to be bound by their terms and conditions. The Contract shall inure to the benefit of and shall be binding upon the CONTRACTOR and the DISTRICT and their respective successors and assigns.

ARTICLE 10 – SEVERABILITY; GOVERNING LAW; CHOICE OF FORUM. If any provision of the Contract shall be held invalid or unenforceable by a court of competent jurisdiction, such holding shall not invalidate or render unenforceable any other provision hereof. The Contract shall be governed by the laws of the State of California. Any action or proceeding seeking any relief under or with respect to this Agreement shall be brought solely in the Superior Court of the State of California for the County where the Project is located, subject to transfer of venue under applicable State law.

ARTICLE 11 – AMENDMENTS. The terms of the Contract shall not be waived, altered, modified, supplemented, or amended in any manner whatsoever except by written agreement signed by the Parties and approved or ratified by the Governing Board.

ARTICLE 12 – ASSIGNMENT OF CONTRACT. The CONTRACTOR shall not assign or transfer by operation of law or otherwise any or all of its rights, burdens, duties, or obligations without the prior written consent of the surety on the payment bond, the surety on the performance bond, and the DISTRICT.

ARTICLE 13 – WRITTEN NOTICE. Written notice shall be deemed to have been duly served if delivered in person to the individual or member of the firm or to an officer of the corporation for whom it was intended, or if delivered at or sent by registered or certified or overnight mail to the last business address known to the person who gives the notice.

ARTICLE 14 – PROVISIONS REQUIRED BY LAW. Each and every provision of law and clause required to be inserted in this contract shall be deemed to be inserted herein, and this Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted or is not inserted correctly, then upon application of either Party the Contract shall forthwith be physically amended to make such insertion or correction.

ARTICLE 15 – AUTHORITY TO EXECUTE. The individual(s) executing this Agreement on behalf of the CONTRACTOR is/are duly and fully authorized to execute this Agreement on behalf of CONTRACTOR and to bind the CONTRACTOR to each and every term, condition, and covenant of the Contract Documents.

[Remainder of Page Intentionally Left Blank]

IN WITNESS WHEREOF, this Agreement has been duly executed by the above-named parties, on the day and year first above written. To the extent that there exists any conflicts or inconsistencies between this Agreement and the General Conditions, the provisions contained in the General Conditions shall govern.

CONTRACTOR:

_____

License No. _____

By: _____

Title: _____

(Corporate Seal)

DISTRICT:

HACIENDA LA PUENTE USD

By: _____
Joel Duarte, Director of Purchasing and Warehouse

Governing Board Date: _____

Agenda Item No. _____

END OF DOCUMENT

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

BID: 2023-24.06R1

TEMPLE ACADEMY PERFORMING ARTS CENTER

SECTION 00 05 00
PERFORMANCE BOND

PERFORMANCE BOND
(CALIFORNIA PUBLIC WORK)

WHEREAS the **HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT** (also referred to herein "OBLIGEE") has awarded to _____, (hereinafter "CONTRACTOR"), a contract for work consisting of but not limited to, furnishing all labor, materials, tools, equipment, services, and incidentals for the **TEMPLE ACADEMY PERFORMING ARTS CENTER, Bid No. 2023-24.06R1** (the "Project"); and

WHEREAS, the Work to be performed by the CONTRACTOR is more particularly set forth in that certain Agreement between the OBLIGEE and CONTRACTOR dated _____, which Agreement and all other contract documents set forth therein (collectively, the "Contract Documents") are incorporated herein and made a part hereof by this reference; and

WHEREAS, the CONTRACTOR is required by said Contract Documents furnish a bond ensuring the CONTRACTOR'S prompt, full and faithful performance of the Work under the Contract Documents ("Bond"),

NOW, THEREFORE, we _____, the undersigned CONTRACTOR, as PRINCIPAL, and _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business under the laws of the State of California, as SURETY, are held and firmly bound, along with our respective heirs, executors, administrators, successors and assigns, jointly and severally, unto the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT in the sum of _____ **DOLLARS, ($_____)**, said sum being not less than 100% of the total amount payable by the said OBLIGEE under the terms of the Contract Documents, in lawful money of the United States, as more particularly set forth herein.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the PRINCIPAL, his or its heirs, executors, administrators, successors or assigns, promptly, fully and faithfully performs each and all of the obligations and things to be done and performed by the PRINCIPAL in strict accordance with the terms of the Contract Documents, as they may be modified or amended from time to time, and if the PRINCIPAL indemnifies and saves harmless the OBLIGEE, its officers, agents and employees from any and all losses, liability and damages, claims, judgments, liens, costs, and fees of every description which may be incurred by the OBLIGEE by reason of the failure or default on the part of the PRINCIPAL in the performance of any or all of the terms or obligations of the Contract Documents, including all modifications and amendments thereto, and any warranties or guarantees required thereunder, as set forth in the Contract Documents, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

The SURETY, for value received, hereby stipulates, and agrees that no change, adjustment of the Contract Time, adjustment of the Contract Price, alterations, deletions, additions, or any other modifications to the terms of the Contract Documents, the Work to be performed thereunder, or to the Specifications or the Drawings shall limit, restrict or otherwise impair SURETY'S obligations or OBLIGEE'S rights hereunder. SURETY hereby waives notice from the OBLIGEE of any such changes, adjustments of Contract Time, adjustments of Contract Price, alterations, deletions, additions or other modifications to the Contract Documents, the Work to be performed under the Contract Documents, or the Drawings or the Specifications.

In the event of the OBLIGEE'S termination of the Contract due to the PRINCIPAL'S breach or default of the Contract Documents, within twenty (20) days after written notice from the OBLIGEE to the SURETY of the PRINCIPAL'S breach or default of the Contract Documents and OBLIGEE'S termination of the Contract, the SURETY shall notify OBLIGEE in writing of SURETY'S assumption of obligations hereunder by its election to either remedy the default or breach of the PRINCIPAL or to take charge of the Work of the Contract Documents and complete the Work at its own expense ("Notice of Election"); provided, however, that the procedure by which the SURETY undertakes to discharge its obligations under this Bond shall be subject to the advance written approval of the OBLIGEE, which approval shall not be unreasonably withheld, limited or restricted. The insolvency of the PRINCIPAL or the PRINCIPAL'S mere denial of a failure of performance or default under the Contract Documents shall not by itself, without the SURETY'S prompt, diligent inquiry, and investigation of such denial, be justification for SURETY'S failure to give the Notice of Election or for its failure to promptly remedy the failure of performance or default of the PRINCIPAL or to complete the Work.

In the event the SURETY fails to issue its Notice of Election to OBLIGEE within the time specified herein, the OBLIGEE may take all such action or actions necessary to cure or remedy the PRINCIPAL'S failure of performance or default or to complete the Work. The PRINCIPAL and the SURETY shall be each jointly and severally liable to the OBLIGEE for all damages and costs sustained by the OBLIGEE as a result of the PRINCIPAL'S failure of performance under the Contract Documents or default in its performance of obligations thereunder, including without limitation the costs of cure or completion exceeding the then remaining balance of the Contract Price; provided that the SURETY'S liability hereunder for the costs of performance, damages and other costs sustained by the OBLIGEE upon the PRINCIPAL'S failure of performance under or default under the Contract Documents shall be limited to the penal sum hereof, which shall be deemed to include the costs or value of any Changes of any Work which increases the Contract Price.

The PRINCIPAL and SURETY agree that if the OBLIGEE is required to engage the services of an attorney in connection with enforcement of the Bond, PRINCIPAL and SURETY shall pay OBLIGEE'S reasonable attorneys' fees incurred, with or without suit, in addition to the above sum.

In the event that suit or other proceeding is brought upon this Bond by the OBLIGEE, the SURETY shall pay to the OBLIGEE all costs, expenses and fees incurred by the OBLIGEE in connection therewith, including without limitation, attorneys' fees.

[Remainder of page intentionally left blank.]

IN WITNESS WHEREOF, we have hereto set our hands and seals this _____ day of _____ 20___.

_____
PRINCIPAL/CONTRACTOR

By: _____
President

_____
SURETY

By: _____
Attorney-in-Fact

The rate of premium on this bond is _____ per thousand.

The total amount of premium charged, $_____.

(The above must be filled in by corporate SURETY.)

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
)
County of _____)

On this _____ day of _____, in the year _____, before me, _____, a Notary Public in and for said state, personally appeared _____, known to me (or proved to be on the basis of satisfactory evidence) to be the person whose name is subscribed to the within instrument as the Attorney-in-Fact of the _____ (SURETY) and acknowledged to me that he subscribed the name of the _____ (SURETY) thereto and his own name as Attorney-in-Fact.

_____
Notary Public in and for said State

(SEAL)

My Commission expires _____.

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the _____ Secretary of the corporation named as PRINCIPAL to the within bond; that _____ who signed the said bond on behalf of the PRINCIPAL was then _____ of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed and attested for and in behalf of said corporation by authority of its governing Board.

(Corporate Seal)

_____
Signature

_____
Date

NOTE: A copy of the power of attorney to local representatives of the bonding company may be attached hereto.

[This space intentionally left blank.]

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

BID: 2023-24.06R1

TEMPLE ACADEMY PERFORMING ARTS CENTER

SECTION 00 06 00
PAYMENT BOND

PAYMENT BOND
(CALIFORNIA PUBLIC WORK)

WHEREAS, the **HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT** (the "OBLIGEE") has awarded to _____ (the "PRINCIPAL") a contract for the Work commonly described as the: **TEMPLE ACADEMY PERFORMING ARTS CENTER, Bid No. 2023-24.06R1** (the "Project"); and

WHEREAS, the Work to be performed by the PRINCIPAL is more particularly set forth in that certain Agreement between the PRINCIPAL and the OBLIGEE, dated _____, which Agreement and all other contract documents set forth therein (collectively, the "Contract Documents") are incorporated herein and made a part hereof by this reference; and

WHEREAS, by the terms of the Contract Documents, and in accordance with California Civil Code §§ 9550 *et seq*., the PRINCIPAL is required to furnish a bond for the prompt, full and faithful payment to any Claimant, as hereinafter defined, for all labor, materials or services used, or reasonably required for use, in the performance of the Work on the Project ("Bond"); and

WHEREAS, the term "Claimant" shall refer to any of the persons described in California Civil Code § 9100, who provide or furnish labor, materials or services used or reasonably required for use in the performance of the Work under the Contract Documents, without regard to whether such labor, materials or services were sold, leased or rented.

NOW THEREFORE, we, _____, as PRINCIPAL, and _____, as SURETY, are held and firmly bound, along with our respective heirs, executors, administrators, successors and assigns, jointly and severally, unto HACIANDA LA PUENTE UNIFIED SCHOOL DISTRICT, as OBLIGEE, for payment of the penal sum of _____ **Dollars ($_____)**, said sum being not less than one hundred percent (100%) of the total amount payable by the OBLIGEE under the terms of the Contract Documents, in lawful money of the United States, as more particularly set forth herein.

This Bond shall inure to the benefit of all Claimants so as to give them, or their assigns and successors, a right of action upon this Bond.

The condition of the obligation is such that if the PRINCIPAL, or its subcontractors, heirs, executors, administrators, successors, or assigns fail to pay (1) any Claimant, (2) amounts due under the Unemployment Insurance Code with respect to Work or labor performed on the Project, or (3) amounts required to be deducted, withheld, and paid to the Employment Development Department from the wages of employees of the PRINCIPAL and its subcontractors under Section 13020 of the Unemployment Insurance Code with respect to the Work and labor, then SURETY will pay for the same in an amount not to exceed the sum specified above and, if an action is brought to enforce the liability on the Bond, the SURETY shall pay such reasonable attorneys' fees as fixed by the court, as set forth in Civil Code § 9554.

If the PRINCIPAL promptly, fully, and faithfully makes payment to any Claimant for all labor, materials or services used or reasonably required for use in the performance of the Work, then this obligation shall be void; otherwise, it shall be, and remain, in full force and effect.

The SURETY, for value received, hereby stipulates and agrees that no change, extension of time, alteration, deletion, addition, or any other modification to the terms of the Contract Documents, the Work to be performed thereunder, the Specifications or the Drawings, or any other portion of the Contract Documents, shall in any way limit, restrict or otherwise affect its obligations under this Bond; the SURETY hereby waives notice from the OBLIGEE of any such change, extension of time, alteration, deletion, addition or other modification to the Contract Documents, the Work to be performed under the Contract Documents, the Drawings or the Specifications of any other portion of the Contract Documents.

IN WITNESS WHEREOF, the PRINCIPAL and SURETY have executed this instrument this ___ day of _____, 20___ by their duly authorized agents or representatives.

(Corporate Seal)

_____
(PRINCIPAL Name)

By: _____
(Signature)

_____
(Typed or Printed Name)

Title: _____

(Corporate Seal)

_____
(SURETY Name)

By:_____
(Signature of Attorney-in-Fact for Surety)

(Attach Attorney-in-Fact Certificate)

_____
(Typed or Printed Name of Attorney-in-Fact)

_____
(Address)

_____
(Area Code and Telephone Number of Surety)

IMPORTANT: THIS IS A REQUIRED FORM.

SURETY companies executing bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write SURETY insurance defined in California Insurance Code Section 105, and if the Work or Project is financed, in whole or in part, with federal, grant or loan funds, SURETY'S name must also appear on the Treasury Department's most current list (Circular 570 as amended).

Any claims under this bond may be addressed to:

(Name and Address of SURETY)	(Name and Address of agent or representative for service for service of process in California)
_____	_____
_____	_____
Telephone:_____	Telephone: _____

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA)
) ss.
COUNTY OF _____)

On _____, before me, _____, a Notary Public, personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal. (SEAL)

_____
Notary Public in and for said State

Commission expires: _____

NOTE: A copy of the power-of-attorney to local representatives of the SURETY must be attached hereto.

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

BID: 2023-24.06R1

TEMPLE ACADEMY PERFORMING ARTS CENTER

SECTION 00 07 00
GENERAL CONDITIONS

TABLE OF CONTENTS

GENERAL CONDITIONS

Article 1. DEFINITIONS

A. The "DISTRICT" and "CONTRACTOR" are those mentioned as such in the agreement. For convenience and brevity, these terms, as well as terms identifying other persons involved in the contract are treated throughout the Contract Documents as if they are of singular number and masculine gender.

B. "Subcontractor," as used herein, includes one having a direct contract with CONTRACTOR who furnishes material worked to a special design according to plans and specifications of this work, but does not include one who merely furnishes material not so worked.

C. "Surety" is the person, firm, or corporation, admitted as a California admitted surety that executes as surety the CONTRACTOR'S Performance Bond and Payment Bond for Public Works.

D. "Provide" shall include "provide complete in place," that is, "furnish and install."

E. Words such as "indicated," "shown," "detailed," "noted," "scheduled," or words of similar meaning shall mean that reference is made to the drawings, unless otherwise noted. It shall be understood that the direction, designation, selection, or similar import of the DISTRICT is intended, unless stated otherwise.

F. "Work" of the CONTRACTOR or Subcontractor includes labor or materials or both.

G. The term "day" as used herein shall mean calendar day unless otherwise specifically designated.

H. Where the words "equal," "equivalent," "satisfactory," "directed," "designated," "selected," "as required," and words of similar meaning are used, the written approval, selection, satisfaction, direction, or similar action of the DISTRICT is required.

I. Where the word "required" and words of similar meaning are used, it shall mean, "as required to properly complete the work as required by the DISTRICT," unless stated otherwise.

J. The word "perform" shall be understood to mean that the CONTRACTOR, at CONTRACTOR'S expense, shall perform all operations necessary to complete the work, including furnishing of necessary labor, tools, and equipment, and further including the furnishing and installing of materials that are indicated, specified, or required to complete such performance.

K. Where the words "acceptable," "acceptance," or words of similar import are used, it shall be understood that the acceptance of the DISTRICT is intended.

L. Where shown, the words "includes," and "including," do not limit the work to the items following those words.

M. The base bids contain a cash allowance for each individual project which is referred to as the "DISTRICT'S Allowance." The DISTRICTS Allowance is to be used at the DISTRICT'S discretion to compensate the CONTRACTOR or costs and expenses associated with Changes to the Work made pursuant to Article 41.

Article 2. DRAWINGS AND SPECIFICATIONS

A. **Contract Documents**. Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all. Any item of Work mentioned in the Specifications and not shown on the Drawings or shown on the Drawings and not mentioned in the Specifications, shall be provided by CONTRACTOR as if shown or mentioned in both. The Contract is bound to provide the Work complete and is under a legal duty to carefully study Plans and Specifications and schedule operations well ahead of time and identify inconsistencies with the Plans and Specifications and call such inconsistencies to the attention of the ARCHITECT or Registered Engineer through the Inspector of Record under Section 4-343(b) of Title 24. The intention of documents is to include all labor and materials, equipment, and transportation necessary for the proper execution of the work. Materials or work described in words which as applied have a well-known technical or trade meaning shall be deemed to refer to such recognized standards.

B. **Interpretations**. Drawings and specifications are intended to be fully cooperative and to agree. However, if CONTRACTOR observes that drawings and specifications are in conflict, he shall promptly notify the DISTRICT in writing and any necessary changes shall be adjusted as provided in the contract for changes in work. If such conflict arises, the following order of precedence shall generally apply, provided, however, that the order of precedence shall not be so rigidly interpreted as to affect an absurd or costly result:

1) Special Conditions shall take precedence over General Conditions.

2) Technical Specifications implement, in additional detail, the requirements of the General Conditions. In the event of conflict between the Technical Specifications and the General Conditions, the General Conditions shall take precedence.

3) In the event of a conflict between the Technical Specifications and the drawings, the higher quality, higher quantity, and most stringent requirements shall be deemed to apply and shall govern as to materials, workmanship, and installation procedures.

4) With regard to drawings:

   (a) Figures govern over scaled dimensions;
   (b) Larger details govern over general drawings;
   (c) Addenda/change order drawings govern over contract drawings;
   (d) Contract drawings govern over standard drawings.

5) Work not particularly shown or specified shall be the same as similar parts that are shown or specified.

C. Misunderstanding of drawings and specifications shall be clarified by the DISTRICT, whose decisions shall be final.

D. Standards, Rules, and Regulations referred to are recognized printed standards and shall be considered as one and a part of these specifications within limits specified.

E. Any interpretation of the Contract Documents, including the Plans or Specifications, controlled, or guided by the provisions of this Article 2 shall be governed by the overriding requirement that in the event there is a discrepancy, conflict, or ambiguity between the various Contract Documents, it is intended that the more stringent, higher quality, and greater quantity of Work shall control and apply.

Article 3. COPIES FURNISHED

CONTRACTOR will be furnished, free of charge, one (1) digital copy of drawings and specifications as set forth in Special Conditions. Additional copies may be obtained at cost of reproduction.

Article 4. OWNERSHIP OF DRAWINGS

All drawings, specifications, and copies thereof furnished by DISTRICT are its property. They are not to be used on other work and with exception of signed contract sets, are to be returned to DISTRICT on request at completion of work.

Article 5. DETAIL DRAWINGS AND INSTRUCTIONS

A. **Examination of Contract Documents**. Before commencing any portion of the Work, CONTRACTOR shall again carefully examine all applicable Contract Documents, the Project site and other information given to CONTRACTOR as to materials and methods of construction and other Project requirements. CONTRACTOR shall immediately notify the DISTRICT Representative of any potential error, inconsistency, ambiguity, conflict or lack of detail or explanation. If CONTRACTOR performs, permits, or causes the performance of any Work which is in error, inconsistent or ambiguous, or not sufficiently detailed or explained, CONTRACTOR shall bear any and all resulting costs, including, without limitation, the cost of correction. In no case shall the CONTRACTOR or any Subcontractor proceed with Work if uncertain as to the applicable requirements.

B. **Additional Instructions**. After notification of any error, inconsistency, ambiguity, conflict or lack of detail or explanation, the DISTRICT Representative will provide any required additional instructions, by means of drawings or other written direction, necessary for proper execution of the Work.

C. **Quality of Parts, Construction, and Finish**. All parts of the Work shall be of the best quality of their respective kinds and the CONTRACTOR must use all diligence to inform itself fully as to the required construction and finish. In no case shall CONTRACTOR proceed with the Work without obtaining first from the DISTRICT Representative such approval as may be necessary for the proper performance of Work.

D. **Contractor's Variation from Contract Document Requirements**. If it is found that the CONTRACTOR has varied from the requirements of the Contract Documents including the requirement to comply with all applicable laws, ordinances, rules and regulations, the DISTRICT Representative may at any time, before or after completion of the Work, order the improper Work removed, remade, or replaced by the CONTRACTOR at the CONTRACTOR'S expense.

[Remainder of Page Intentionally Left Blank]

Article 6. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

A. The Project shall be commenced on the date of the award of the Contract and shall be completed by CONTRACTOR in the time specified in the Special Conditions. All Contract Documents, including the Contract, the necessary original Certificates of Insurance, Endorsements of Insurance, Performance Bond, Payment Bond, and all other documentation and certification required by the Contract must be received by DISTRICT **within five (5)** days of Contract award. The DISTRICT has stipulated in the Bid Form and the Special Conditions the schedule for contract submittals. The DISTRICT is under no obligation to consider early completion of the Project and the contract completion date shall not be amended by the DISTRICT'S acceptance of the CONTRACTOR'S proposed earlier completion date. Furthermore, CONTRACTOR shall not, under any circumstances receive additional compensation from the DISTRICT for indirect, general, administrative, or other forms of overhead costs for the period between the time of earlier completion proposed by the CONTRACTOR and the official contract completion date. If the Work is not completed in accordance with the foregoing, it is understood that the DISTRICT will suffer damage. It being impractical and infeasible to determine the amount of actual damage, it is agreed that CONTRACTOR shall pay to DISTRICT as fixed and liquidated damages, and not as a penalty, the sum stipulated in the Special Conditions for each calendar day of delay until the Work is completed and accepted. CONTRACTOR and his surety shall be liable for the amount thereof. Any money due or to become due the CONTRACTOR may be retained to cover said liquidated damages. Should such money not be sufficient to cover said liquidated damages, DISTRICT shall have the right to recover the balance from the CONTRACTOR or his sureties, who will pay said balance forthwith. Regardless of the timelines in the schedule submitted by CONTRACTOR, no delay claims shall be accepted by DISTRICT unless the event or occurrence delays the completion of the Project beyond the contractual completion date.

B. CONTRACTOR shall abide by the DISTRICT'S determination of what constitutes inclement weather based upon the inspector or geotechnical engineer's recommendation. A bad weather day is a day when the weather causes unsafe work conditions or is unsuitable for work that should not be performed during inclement weather (e.g., exterior finishes). Time extensions shall only be granted when the work that is stopped during inclement weather is on the critical path of the Project schedule. The DISTRICT'S consideration of time extension requests will take into account situations when rain days exceed the normal frequency and amount based on the closest weather station data averaged over the past three (3) years, for the period of this Contract and when CONTRACTOR can show such rain days impact the critical path. CONTRACTOR shall be expected to perform all work he can possibly complete during inclement weather (e.g., interior work).

C. **Extension of Time**. CONTRACTOR shall not be charged liquidated damages because of any delays in completion of the Work due to unforeseeable causes beyond the control and without the fault or negligence of CONTRACTOR including, but not restricted to: acts of God, or of public enemy, acts of Government, acts of DISTRICT or anyone employed by it or acts of another CONTRACTOR in performance of a separate contract directly with DISTRICT, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather or delays of Subcontractors due to such causes. CONTRACTOR shall within five (5) days of beginning of any such delay (unless DISTRICT grants a further period of time prior to date of final settlement of the contract) notify DISTRICT in writing of causes of delay. The DISTRICT shall ascertain the facts and extent of delay and grant extension of time for completing the Work when, in its judgment, the findings of fact justify such an extension. The DISTRICT'S findings of fact shall be final and conclusive on all parties. In case of a continuing cause of delay, only one claim is necessary. Time extensions to the Project should be requested by the CONTRACTOR as

they occur and without delay. Regardless of the timelines in the schedule submitted by CONTRACTOR, no delay claims shall be accepted by DISTRICT unless the event or occurrence delays the completion of the Project beyond the contractual completion date.

D. **Determining Damages for Delay**

1) DISTRICT'S liability to CONTRACTOR for delays for which DISTRICT is responsible shall be limited to an extension of time for delays unless such delays: 1) were unreasonable under the circumstances involved; 2) were not within the contemplation of the parties when the contract was awarded; 3) CONTRACTOR complies with the Change Order procedures, and if necessary, the Claims procedures of the Contract Documents; 4) the delay could not have been avoided or mitigated by the CONTRACTOR'S care, prudence, foresight, and diligence; 5) The delay extends the most current Contract Completion date; and 6) The delay is not concurrent with a CONTRACTOR-caused delay or other type of Excusable Delay ("Compensable Delay"). A Compensable Delay is a delay that (1) the DISTRICT agrees is a Compensable Delay or (2) a delay for which the DISTRICT disputes responsibility but is held responsible for such delay.

2) In the event of a Compensable Delay, CONTRACTOR and the DISTRICT agree that is impractical and infeasible to determine the amount of actual damage suffered by the CONTRACTOR and its Subcontractors as a result of the delay (such damages include, but are not limited to, extended field overhead, office overhead, mobilization, de-mobilization, impacts and Subcontractor delay costs regardless of tier). Accordingly, in such an instance, it is agreed that DISTRICT will pay to CONTRACTOR as fixed and liquidated damages, and not as a penalty and as reasonably anticipated damage for delay under the circumstances, the sum set forth in the Special Conditions.

3) If for any reason the Liquidated Damage provision set forth above in Article 6(D)(2) is held unenforceable for any reason, CONTRACTOR'S damages, if any, shall be limited to direct, actual, and unavoidable additional costs of labor, materials or construction equipment directly resulting from that delay, and shall exclude special, indirect, or consequential damages. In no event shall CONTRACTOR seek costs or damages for delays, interruptions, hindrances or disruptions to the Work for on-Site or off-Site costs or damages based upon formulas, e.g. Eichleay or other formula. Except as expressly provided for herein, CONTRACTOR shall not have any other claim, demand or right to adjustment of the Contract Price arising out of delay, interruption, hindrance, or disruption to the progress of the Work. The DISTRICT shall not be liable for any damages which the CONTRACTOR could have avoided by any reasonable means including, but not limited to, the judicious handling of forces, equipment, or plant.

E. **Removal or Relocation of Main or Trunkline Utility Facilities**. The CONTRACTOR shall not be assessed for liquidated damages for delay in completion of the Project, when such delay was caused by the failure of the DISTRICT of this Contract or the owner of the utility to provide for removal or relocation of the existing main or trunkline utility facilities; however, when the CONTRACTOR is aware that removal or relocation of an existing utility has not been provided for, CONTRACTOR shall promptly notify the awarding authority and the utility in writing, so that provision for such removal or relocation may be made to avoid and minimize any delay which might be caused by the failure to remove or relocate the main or trunkline utility facilities, or to provide for its removal or relocation. In accordance with Section 4215 of the Government Code, if the CONTRACTOR while performing the Contract discovers any existing main or trunkline utility facilities not identified by the DISTRICT in the Contract plans or specifications, he shall immediately

notify the DISTRICT and utility in writing. The public utility, where it is the owner, shall have the sole discretion to perform repairs or relocation work or permit the CONTRACTOR to do such repairs or relocation work at a reasonable price. The CONTRACTOR shall be compensated for the costs of locating, repairing damage not due to the failure of the CONTRACTOR to exercise reasonable care, and removing or relocating such utility facilities not indicated in the plans and specifications with reasonable accuracy, and for equipment on the project necessarily idled during such work. Such compensation shall be in accordance with the extra work provisions set out at Article 40 hereof. Alternatively, the DISTRICT may make changes in the alignment and grade of the Work to obviate the need to remove, relocate, or temporarily maintain the utility, or the DISTRICT may make arrangements with the owner of the utility for such work to be done at no cost to the CONTRACTOR.

Nothing herein shall preclude the DISTRICT from pursuing any appropriate remedy against the utility for delays which are the responsibility of the utility. Further, nothing herein shall be construed to relieve the utility from any obligation as required either by law or by contract to pay the cost of removal or relocation of existing utility facilities.

Article 7. PROGRESS SCHEDULE

A. Within seven (7) calendar days after the date of the award of the Contract, CONTRACTOR shall prepare a baseline progress schedule in hard copy and digital form and shall submit this schedule for the DISTRICT'S approval. The schedule shall clearly identify all staffing and other resources which in the CONTRACTOR'S judgment are needed to complete the Project within the time specified for completion. The schedule shall include milestones and shall include the "critical path" of construction. The CONTRACTOR is fully responsible to determine and provide for any and all staffing and resources at levels which allow for good quality and timely completion of the Project; the DISTRICT'S approval of the progress schedule does not relieve the CONTRACTOR of any such responsibility. CONTRACTOR'S failure to incorporate all elements of work required for the performance of the Contract or any inaccuracy in the schedule shall not excuse the CONTRACTOR from performing all work required for a completed project within the specified contract time period, notwithstanding the DISTRICT'S acceptance of the schedule. **The first payment will not be made unless the DISTRICT has been provided and has accepted the project schedule**.

B. The schedule shall allow enough time for inclement weather. Such schedule shall indicate graphically the beginning and completion dates of all phases of construction, and shall indicate the critical path for all critical, sequential time related activities. All required schedules shall indicate "float time" for all "slack" or "gaps" in the non-critical activities. Submitted construction schedules shall have a duration which does not exceed the contract time. Excess time may be picked up with "float time" at the discretion of the DISTRICT. A "bar chart" in reasonably complete detail shall be adequate in contracts over $1 million and shall show critical path items. All required schedules shall be periodically updated to reflect changes in the status of the job, including weather delays. **At a minimum, the CONTRACTOR shall be required to provide and keep updated a monthly schedule in order to prevent delay claims**.

Article 8. CONTRACT SECURITY

Unless otherwise specified in the Contract Documents, prior to commencing any portion of the Work, the CONTRACTOR shall apply for and furnish the DISTRICT separate payment and performance bonds for its portion of the Work which shall cover 100% faithful performance of and payment of all obligations arising under the Contract Documents and/or guaranteeing the payment in full of all claims for labor performed and materials supplied for the Work. All bonds shall be provided by a corporate surety authorized and admitted to transact business in California. All bonds shall be submitted on the DISTRICT'S approved form.

To the extent, if any, that the Contract price is increased in accordance with the Contract Documents, the CONTRACTOR shall cause the amount of the bonds to be increased accordingly and shall promptly deliver satisfactory evidence of such increase to the DISTRICT. To the extent available, the bonds shall further provide that no change or alteration of the Contract Documents (including, without limitation, an increase in the Contract price, as referred to above), extensions of time, or modifications of the time, terms, or conditions of payment to the CONTRACTOR will release the surety. If the CONTRACTOR fails to furnish the required bond, the DISTRICT may terminate the Contract for cause.

Article 9. ASSIGNMENT

CONTRACTOR shall not assign this Contract or any part thereof without prior written consent of DISTRICT. Any assignment of money due or to become due under this Contract shall be subject to a prior lien for services rendered or material supplied for performance of the Work called for under said Contract in favor of all persons, firms, or corporations rendering such services or supplying such materials to the extent that claims are filed pursuant to the Civil Code, the Code of Civil Procedure, and/or the Government Code. If CONTRACTOR attempts to make such an assignment without such consent, CONTRACTOR shall nevertheless remain legally responsible for all obligations under the Contract.

Article 10. PROHIBITED INTERESTS

No official of the DISTRICT and no DISTRICT representative who is authorized in such capacity and on behalf of the DISTRICT to negotiate, make, accept, or approve, or to take part in negotiating, making, accepting or approving any engineering, inspection, construction or material supply contract or any subcontract in connection with construction of the Project, shall be or become directly or indirectly interested financially in this Contract or in any part thereof. No officer, employee, attorney, engineer, or inspector of or for the DISTRICT who is authorized in such capacity and on behalf of the DISTRICT to exercise any executive, supervisory or other similar functions in connection with construction of the Project, shall become directly or indirectly interested financially in this Contract or in any part thereof.

Article 11. SEPARATE CONTRACTS

DISTRICT reserves the right to let other contracts in connection with this Work or other work at the same site. CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for introduction and storage of their materials and execution of their work and shall properly connect and coordinate his Work with theirs.

If any part of CONTRACTOR'S Work depends for proper execution or results upon work of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to DISTRICT any defects in such work that renders it unsuitable for such proper execution and results. His failure to inspect and report shall constitute his acceptance of other CONTRACTOR'S work as fit and proper for reception of his Work, except as to defects which may develop in the other CONTRACTOR'S work after execution of CONTRACTOR'S Work.

To ensure proper execution of his subsequent work, CONTRACTOR shall measure and inspect work already in place and shall at once report to the DISTRICT any discrepancy between executed work and the Contract Documents.

CONTRACTOR shall ascertain to his own satisfaction the scope of the Project and nature of any other contracts that have been or may be awarded by DISTRICT in prosecution of the Project to the end that CONTRACTOR may perform this Contract in the light of such other contracts, if any. Nothing herein contained shall be interpreted as granting to CONTRACTOR exclusive occupancy at the Project site. CONTRACTOR shall not cause any unnecessary hindrance or delay to any other CONTRACTOR working on project. If simultaneous execution of any contract for the Project is likely to cause interference with performance of some other contract or contracts, DISTRICT shall decide which CONTRACTOR shall cease work temporarily and which CONTRACTOR shall continue or whether work can be coordinated so that CONTRACTORS may proceed simultaneously. DISTRICT shall not be responsible for any damages suffered or for extra costs incurred by CONTRACTOR resulting directly or indirectly from award, performance, or attempted performance of any other contract or contracts on the Project or caused by any decision or omission of DISTRICT respecting the order of precedence in performance of contracts.

Article 12. SUBCONTRACTING

A. CONTRACTOR agrees to bind every Subcontractor by terms of the Contract as far as such terms are applicable to Subcontractor's work. If CONTRACTOR subcontracts any part of this Contract, CONTRACTOR shall be as fully responsible to DISTRICT for the acts and omissions of his Subcontractor and of persons either directly or indirectly employed by his Subcontractor, as he is for acts and omissions of persons directly employed by himself. Nothing contained in these Contract Documents shall create any contractual relation between any Subcontractor and DISTRICT. The DISTRICT shall be deemed to be the third-party beneficiary of the Contract between the CONTRACTOR and the Subcontractor.

B. DISTRICT'S consent to or approval of any Subcontractor under this Contract shall not in any way relieve CONTRACTOR of his obligations under this Contract and no such consent or approval shall be deemed to waive any provision of this Contract. The DISTRICT reserves the right of approval of all Subcontractors proposed for use on this Project, and to this end, may require financial, performance and such additional information as is needed to secure this approval. If a Subcontractor is not approved, the CONTRACTOR shall promptly submit another of the same trade for approval.

C. Substitution or addition of Subcontractors shall be permitted only as authorized in California Public Contract Code Sections 4100 et seq.

Article 13. DISTRICT'S RIGHT TO TERMINATE CONTRACT

A. **Termination for Cause**. DISTRICT may, without prejudice to any other right or remedy, serve written notice of intent to terminate upon CONTRACTOR and his surety stating its intention to terminate this Contract if the CONTRACTOR (i) refuses or fails to prosecute the Work or any separable part thereof with such diligence as will ensure its completion within the time specified or any extension thereof, or (ii) fails to complete said Work within such time, or (iii) if the CONTRACTOR should file a bankruptcy petition, or (iv) if he should make a general assignment for the benefit of his creditors, or (v) if a receiver should be appointed on account of his insolvency, or (vi) if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials to complete the Work in the time specified, or (vii) if he should fail to make prompt payment to Subcontractors or for material or labor, or (viii) persistently disregard laws, ordinances or instructions of DISTRICT, or (ix) otherwise

substantially violate any provision of the Contract, or (x) if he or his Subcontractors should violate any of the provisions of this Contract. The notice of intent to terminate shall state generally the reasons for such intention to terminate. Unless within five (5) days after the service of such notice, such condition shall cease or such violation shall cease and satisfactory arrangements for the correction thereof be made, this Contract shall be deemed to have ceased and terminated. Upon the termination of the Contract as provided above, DISTRICT shall immediately serve upon surety and the CONTRACTOR written notice of termination stating that the Contract has ceased and terminated. Surety shall have the right to investigate, take over and perform this Contract, provided, however, that if surety, within five (5) days after service upon it of said notice of termination, does not give DISTRICT written notice of its intention to take over and perform this Contract and does not commence performance thereof within seven (7) days from the date of service upon it of such notice of termination, DISTRICT may take over the work and prosecute same to completion by the Contract or by any other method it may deem advisable for the account and at the expense of CONTRACTOR. If Surety does not perform the Project Work itself, the surety shall consult with the DISTRICT regarding its planned choice of a CONTRACTOR or CONTRACTORS to complete the Project, and upon request by DISTRICT, surety shall provide the DISTRICT with evidence of responsibility of surety's proposed CONTRACTOR or CONTRACTORS. DISTRICT shall be entitled to reject surety's choice of CONTRACTOR or CONTRACTORS if DISTRICT determines in is sole discretion that the CONTRACTOR or CONTRACTORS are non-responsible. If surety provides DISTRICT written notice of its intention to take over and perform this Contract, within fourteen (14) days of such written notice of intent to take over and perform, surety or its chosen CONTRACTOR or CONTRACTORS (if such CONTRACTOR or CONTRACTORS are approved by DISTRICT) shall provide DISTRICT a detailed Progress Schedule as specified in Article 7 above. CONTRACTOR and his surety shall be liable to DISTRICT for any excess cost or other damages occasioned the DISTRICT as a result of surety or surety's CONTRACTOR or CONTRACTORS' takeover and performance. If the DISTRICT takes over the Work as hereinabove provided, the DISTRICT may, without liability for so doing, take possession of and utilize in completing the Work such materials, appliances, plant, and other property belonging to the CONTRACTOR as may be on the site of the Work and necessary, therefore.

If the unpaid balance of the Contract price exceeds the expense of finishing the Work, including compensation for additional managerial and administrative services, such excess shall be paid to CONTRACTOR. If such expense shall exceed such unpaid balance, CONTRACTOR shall pay the difference to DISTRICT. Expense incurred by DISTRICT as herein provided, and damage incurred through CONTRACTOR'S default, shall be certified by DISTRICT.

The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to the DISTRICT.

Notwithstanding the foregoing provisions, this Contract may not be terminated or modified where a trustee-in-bankruptcy has assumed the Contract pursuant to 11 U.S.C. Section 365 (Federal Bankruptcy Act).

In the event the Contract is terminated pursuant to this Article 13.1, the termination shall not affect or limit any rights or remedies of the DISTRICT against the CONTRACTOR or the Surety. The rights and remedies of the DISTRICT under this Article 13.1 are in addition to, and not in lieu of, any other rights and remedies provided by law or otherwise under the Contract Documents. Any retention or payment of monies to the CONTRACTOR by the DISTRICT shall not be deemed to release the CONTRACTOR or the Surety from any liability hereunder.

B. **Termination for Convenience of the DISTRICT**. The DISTRICT may at any time, in its sole and exclusive discretion, by written notice to the CONTRACTOR, terminate the Contract or the CONTRACTOR'S performance of the Contract, in whole or in part, when it is in the interest of, or for the convenience of, the DISTRICT. In such case, the CONTRACTOR shall be entitled to payment for: (i) Work actually performed and in place as of the effective date of such termination for convenience of the DISTRICT, with a reasonable allowance for profit and overhead on such Work, and (ii) reasonable termination expenses for reasonable protection of Work in place and suitable storage and protection of materials and equipment delivered to the site of the Work but not yet incorporated into the Work, provided that such payments exclusive of termination expenses shall not exceed the total Contract Price as reduced by payments previously made to the CONTRACTOR and as further reduced by the value of the Work as not yet completed. The CONTRACTOR shall not be entitled to profit and overhead on Work which was not performed as of the effective date of the termination for convenience of the DISTRICT or for any other damages, direct or indirect, which the CONTRACTOR or anyone claiming through the CONTRACTOR alleges resulted from the DISTRICT'S election to terminate under this Article 13.2 or where a termination under Article 13.1 has been converted to a termination for convenience under Article 13.3. The DISTRICT may, in its sole discretion, elect to have subcontracts assigned after exercising the right hereunder to terminate for the DISTRICT'S convenience.

C. **Conversion to Termination for Convenience**. In the event the Contract is terminated under this Article 13.1 and it is finally determined by an arbitrator, court, jury or other tribunal having jurisdiction, for any reason, that the CONTRACTOR was not in default under the provisions hereof or that the DISTRICT'S exercise of its rights under Article 13.1 was defective, deficient, ineffective, invalid or improper for any reason, the termination shall be deemed a Termination for Convenience of the DISTRICT and thereupon, the rights and obligations of the DISTRICT and the CONTRACTOR shall be determined in accordance with Article 13.2 hereof.

Article 14. GUARANTEE

CONTRACTOR warrants to the DISTRICT that material and equipment furnished under the Contract will be of the highest quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The CONTRACTOR'S warranty does not cover damage or defect caused by abuse, modifications not executed by the CONTRACTOR, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the DISTRICT, the CONTRACTOR shall furnish satisfactory evidence as to the kind and quality of materials and equipment. So long as DISTRICT forwards written notification of any warranty item to CONTRACTOR within the warranty period, CONTRACTOR'S obligation to correct the warranty item continues until the correction is made. As stated in the Project Warranty form, the warranty period is at least two (2) years. In the event of failure of the CONTRACTOR to repair a defect within seven (7) days after being notified in writing, the DISTRICT is hereby authorized to proceed to have defects repaired and made good at expense of the CONTRACTOR who shall pay costs and charges therefore immediately on demand.

If, in the opinion of the DISTRICT, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to the DISTRICT or to prevent interruption of operations of the DISTRICT, the DISTRICT will attempt to give the notice required by this article. If the CONTRACTOR cannot be contacted or does not comply with the DISTRICT'S request for correction within a reasonable time as determined by the DISTRICT, the DISTRICT may, notwithstanding the provisions of this article, proceed to make such correction or provide such attention. The costs of such correction or attention shall be charged against the CONTRACTOR. Such action by the DISTRICT will not relieve the CONTRACTOR of the guarantees provided in this article or elsewhere in this Contract.

This article does not in any way limit the guarantee on any items for which a longer guarantee is specified or on any items for which a manufacturer gives a guarantee for a longer period. CONTRACTOR shall furnish DISTRICT with all appropriate guarantee or warranty certificates, in a form acceptable to DISTRICT, prior to the final payment made to CONTRACTOR.

Article 15. NOTICE AND SERVICE THEREOF

A. Any notice from one party to the other under the Contract shall be in writing and shall be dated and signed by the party giving such notice or by the duly authorized representative of such party. Any such notice shall not be effective for any purpose whatsoever unless served in one of the following manners:

1) If notice is given to DISTRICT, by personal delivery thereof to DISTRICT'S representative or by depositing same in United States mail, enclosed in a sealed envelope addressed to DISTRICT for attention of said representative or DISTRICT, postage prepaid, and registered.

2) If notice is given to CONTRACTOR, by personal delivery thereof to said CONTRACTOR or to his foreman at site of the Project, or by depositing same in United States mail, enclosed in a sealed envelope addressed to said CONTRACTOR at his regular place of business or at such other address as may have been established for the conduct of work under this contract, postage prepaid and, registered.

3) If notice is given to surety or other person, by personal delivery to such surety or other person or by depositing same in United States mail, enclosed in a sealed envelope addressed to such surety or person at the address of such surety or person last communicated by him to party giving notice, postage prepaid and registered.

4) If notice is served by mail, it shall be deemed received and all time periods associated with the giving of notice shall run from the third day after mailing.

Article 16. WORKERS

A. CONTRACTOR shall at all times enforce strict discipline and good order among his employees. CONTRACTOR shall not employ on work any unfit person or anyone not skilled in work assigned to him.

B. Any person in the employ of the CONTRACTOR whom the DISTRICT may deem incompetent or unfit shall be dismissed from work and shall not again be employed on it except with the written consent of DISTRICT.

C. The DISTRICT reserves the right to request that the Project Supervisor be replaced immediately.

Article 17. WAGE RATES, PAYROLL RECORDS, AND DEBARMENT

A. The CONTRACTOR is aware of the requirements of California Labor Code Sections 1720 et seq. and 1770 et seq., as well as California Code of Regulations, Title 8, Section 16000 et seq. ("Prevailing Wage Laws"), which require the payment of prevailing wage rates and the performance of other requirements on certain "public works" and "maintenance" projects. Since this Project involves an applicable "public works" or "maintenance" project, as defined by the Prevailing Wage Laws, and since the total compensation is $1,000 or more, CONTRACTOR agrees to fully comply with such Prevailing Wage Laws. The CONTRACTOR shall obtain a copy of the prevailing rates of per diem wages at the commencement of this Agreement from the website of the Division of Labor Statistics and Research of the Department of Industrial Relations located at www.dir.ca.gov/dlsr/. In the alternative, the CONTRACTOR may view a copy of the prevailing rates of per diem wages at the DISTRICT'S Facilities Department. CONTRACTOR shall make copies of the prevailing rates of per diem wages for each craft, classification or type of worker needed to perform work on the Project available to interested parties upon request and shall post copies at the CONTRACTOR'S principal place of business and at the Project site. CONTRACTOR shall defend, indemnify, and hold the DISTRICT, its elected officials, officers, employees, and agents free and harmless from any claims, liabilities, costs, penalties, or interest arising out of any failure or allege failure to comply with the Prevailing Wage Laws.

B. **The CONTRACTOR and each Subcontractor shall forfeit as a penalty to the DISTRICT not more than Two Hundred Dollars ($200) for each calendar day, or portion thereof, for each worker paid less than the stipulated prevailing wage rate for any work done by him, or by any subcontract under him, in violation of the provisions of the California Labor Code. The difference between such stipulated prevailing wage rate and the amount paid to each worker for** each calendar day or portion thereof for which each worker was paid less than the stipulated prevailing wage rate shall be paid to each worker by the CONTRACTOR.

C. As a further material part of this Contract, CONTRACTOR agrees to hold harmless and indemnify the DISTRICT, its Board members, and its officers, employees and agents from any and all claims, liability, loss, costs, damages, expenses, fines and penalties, of whatever kind or nature, including all costs of defense and attorneys' fees, arising from any alleged failure of CONTRACTOR or its Subcontractors to comply with the Prevailing Wage Laws of the State of California. If the DISTRICT or any of the indemnified parties are named as a party in any dispute arising from the failure of CONTRACTOR or its Subcontractors to pay prevailing wages, CONTRACTOR agrees that the DISTRICT and the other indemnified parties may appoint their own independent counsel, and CONTRACTOR agrees to pay all attorneys' fees and defense costs of the DISTRICT and the other indemnified parties as billed, in addition to all other damages, fines, penalties and losses incurred by the DISTRICT and the other indemnified parties as a result of the action.

D. Accurate payroll records shall be kept by the CONTRACTOR and each Subcontractor, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the Work.

E. It shall be the responsibility of CONTRACTOR to comply with Labor Code Section 1776 as it may be amended by the Legislature from time to time with respect to each payroll record. Labor Code Section 1776 provides in relevant part,

1) Each CONTRACTOR and Subcontractor shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

(a) The information contained in the payroll record is true and correct.

(b) The employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project.

2) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the CONTRACTOR on the following basis:

(a) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.

(b) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the body awarding the contract, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations.

(c) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through either the body awarding the contract, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the CONTRACTOR, Subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the CONTRACTOR.

3) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division. The payroll records may consist of printouts of payroll data that are maintained as computer records, if the printouts contain the same information as the forms provided by the division and the printouts are verified in the manner specified in (a) above.

4) A CONTRACTOR or Subcontractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested the records within ten (10) days after receipt of a written request.

5) Except as provided in subdivision (f), any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated to prevent disclosure of an individual's name, address, and social security number. The name and address of the CONTRACTOR awarded the contract or the Subcontractor performing the contract shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a multiemployer Taft-Hartley trust fund (29 U.S.C. Sec. 186(c)(5)) that requests the records for the purposes of allocating contributions to participants shall be marked or obliterated only to prevent disclosure of an individual's full social security number but shall provide the last four digits of the social security number. Any copy of records made available for inspection by, or furnished to, a joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (29 U.S.C. Sec. 175a) shall be marked or obliterated only to prevent disclosure of an individual's social security number.

6) Notwithstanding any other provision of law, agencies that are included in the Joint Enforcement Strike Force on the Underground Economy established pursuant to Section 329 of the Unemployment Insurance Code and other law enforcement agencies investigating violations of law shall, upon request, be provided non-redacted copies of certified payroll records. Any copies of records or certified payroll made available for inspection and furnished upon request to the public by an agency included in the Joint Enforcement Strike Force on the Underground Economy or to a law enforcement agency investigating a violation of law shall be marked or redacted to prevent disclosure of an individual's name, address, and social security number.

   (a) An employer shall not be liable for damages in a civil action for any reasonable act or omission taken in good faith in compliance with this subdivision.

7) The CONTRACTOR shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within five (5) working days, provide a notice of a change of location and address.

8) The CONTRACTOR or Subcontractor shall have 10 days in which to comply subsequent to receipt of a written notice requesting the records enumerated in subdivision (a). In the event that the CONTRACTOR or Subcontractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit One Hundred Dollars ($100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. A CONTRACTOR is not subject to a penalty assessment pursuant to this Section due to the failure of a Subcontractor to comply with this Section.

   (a) The body awarding the contract shall cause to be inserted in the contract stipulations to effectuate this Section."

9) Debarment. The CONTRACTOR or any Subcontractor working under the CONTRACTOR may not perform work on a public works project with a Subcontractor who is ineligible to perform work on a public project pursuant to Section 1777.1 or Section 1777.7 of the California Labor Code. Any contract on a public works project entered into between the CONTRACTOR and a debarred Subcontractor is void as a matter of law. A debarred Subcontractor may not receive any public money for performing work as a Subcontractor on a public works contract. Any public money that is paid or may have been paid to a debarred Subcontractor by the CONTRACTOR on the project shall be returned to the DISTRICT. The CONTRACTOR shall be responsible for the payment of wages to workers of a debarred Subcontractor who has been allowed to work on the project.

Article 18. APPRENTICES

CONTRACTOR'S attention is directed to the provisions of Sections 1777.5, 1777.6, and 1777.7 of the California Labor Code concerning employment of apprentices by the CONTRACTOR or any Subcontractor under him. The CONTRACTOR shall be knowledgeable of and comply with all California Labor Code Sections including 1727, 1773.5, 1775, 1777, 1777.5, 1810, 1813, 1860, including all amendments; each of these Sections is incorporated by reference into this Contract. The responsibility for compliance with these provisions for all apprentice able occupations rests with the CONTRACTOR. Knowing violations of Section 1777.5 will result in forfeiture not to exceed $100 for each calendar day of non-compliance pursuant to Section 1777.7.

Article 19. HOURS OF WORK

A. As provided in article 3 (commencing at Section 1810), chapter 1, part 7, division 2 of the Labor Code, eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by the CONTRACTOR or by any Subcontractor on any subcontract under this Contract upon the Work or upon any part of the Work contemplated by this Contract is limited and restricted to eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except as hereinafter provided. Notwithstanding the provisions herein above set forth, work performed by employees of CONTRACTOR in excess of eight (8) hours per day, and forty (40) hours during any one week, shall be permitted upon this public work upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.

B. The CONTRACTOR and every Subcontractor shall keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by him in connection with the Work or any part of the Work contemplated by this Contract. The record shall be kept open at all reasonable hours to the inspection of the DISTRICT and to the Division of Labor Law Enforcement, Department of Industrial Relations of the State of California.

C. The CONTRACTOR shall pay to the DISTRICT a penalty of twenty-five dollars ($25) for each worker employed in the execution of this Contract by the CONTRACTOR or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any calendar day and forty (40) hours in any one calendar week in violation of the provisions of article 3 (commencing at Section 1810), chapter 1, part 7, division 2 of the Labor Code.

D. Any work necessary to be performed after regular working hours or on Sundays or other holidays shall be performed without additional expense to DISTRICT. Refer to Special Conditions for information on specific time-of-day and weekend hour restrictions which apply to this Contract.

Article 20. WORKERS' COMPENSATION INSURANCE

A. The CONTRACTOR shall provide, during the life of this Contract, workers' compensation insurance for all of his employees engaged in work under this Contract, on or at the site of the Project, and, in case any of his work is sublet, the CONTRACTOR shall require the Subcontractor similarly to provide workers' compensation insurance for all the latter's employees. Any class of employee or employees not covered by a Subcontractor's insurance shall be covered by the CONTRACTOR'S insurance. In case any class of employees engaged in work under this Contract, on or at the site of the Project, is not protected under the workers' compensation statutes, the CONTRACTOR shall provide or shall cause a Subcontractor to provide, adequate insurance coverage for the protection of such employees not otherwise protected. The CONTRACTOR shall file with the DISTRICT certificates of his insurance protecting workers.

B. Company or companies providing insurance coverage shall be acceptable to the DISTRICT, and in the following form and coverage.

1) Statutory Workers' Compensation and Employer's Liability Coverage: CONTRACTOR shall maintain insurance to afford protection for all claims under California Workers' Compensation Act and other employee benefit acts, and in addition, shall maintain Employer's Liability Insurance for a minimum limit of $1,000,000. The Workers' Compensation Policy shall include the following endorsements, copies of which shall be provided to DISTRICT:

(a) The Voluntary Compensation Endorsement; and
(b) Broad Form All States Endorsement; and
(c) The Longshoremen's and Harbor Workers endorsement, where applicable to the Work under this Contract; and
(d) Waiver of Subrogation Endorsement.

Article 21. COMMERCIAL GENERAL LIABILITY AND PROPERTY DAMAGE INSURANCE

A. CONTRACTOR shall procure and maintain during the life of this Contract and for such other period as may be required herein, at its sole expense, such comprehensive general liability insurance or commercial general liability and property damage insurance as shall protect CONTRACTOR and DISTRICT from all claims for bodily (personal) injury, including accidental death, as well as claims for property damage arising from operations under this Contract, and other covered loss, however occasioned, occurring during the policy term. Such policy shall comply with all the requirements of this article and shall be in the form and amounts as set forth in the Special Conditions. The limits set forth in the Special Conditions shall not be construed to relieve the CONTRACTOR from liability in excess of such coverage, nor shall it limit CONTRACTOR'S indemnification obligations to the DISTRICT and shall not preclude the DISTRICT from taking such other actions available to the DISTRICT under other provisions of the Contract Documents or law.

B. CONTRACTOR shall make certain that any and all Subcontractors hired by CONTRACTOR are insured in accordance with this Contract. If any Subcontractor's coverage does not comply with the foregoing provisions, CONTRACTOR shall indemnify and hold DISTRICT harmless from any damage, loss, cost, or expense, including attorneys' fees, incurred by DISTRICT as a result thereof.

C. Company or companies providing insurance coverage shall be acceptable to the DISTRICT and authorized to conduct business in the State of California.

D. Any general liability policy provided by CONTRACTOR hereunder shall contain an endorsement which applies its coverage to DISTRICT, members of DISTRICT'S board of trustees, and the officers, agents, employees and volunteers of DISTRICT, the State Allocation Board, if applicable, and the DISTRICT'S consultants, individually and collectively, as additional insureds using form CG2010 11-85 or equivalent which must include products and completed operations coverage, broad form property damage coverage, coverage for collapse, explosion and underground, and include independent CONTRACTOR coverage.

E. The coverage afforded by the additional insured endorsement described in paragraph (d) above, shall apply as primary insurance, and any other insurance maintained by DISTRICT, the members of DISTRICT'S Board of Trustees, or its officers, agents, employees and volunteers, or any self-funded program of DISTRICT, shall be in excess only and not contributing to such coverage.

F. CONTRACTOR shall notify DISTRICT in writing of the amount, if any, of self-insured retention provided under the General Liability coverage, with a maximum limit of $25,000. DISTRICT may approve higher retention amounts, based upon review of documentation submitted by CONTRACTOR. Such review shall take into consideration CONTRACTOR'S net worth and reserves for payment of claims of liability against CONTRACTOR, which must be sufficient to adequately compensate for the lack of other insurance coverage required hereunder.

G. All general liability policies shall be written to apply to all bodily injury, including death, property damage, personal injury, and other covered loss, however occasioned, occurring during the policy term, and shall specifically insure the performance by CONTRACTOR of that part of the indemnification contained in Article 25 hereof, relating to liability for injury to or death of persons and damage to property. If the coverage contains one or more aggregate limits, a minimum of 50% of any such aggregate limit must remain available at all times; if over 50% of any aggregate limit has been paid or reserved, DISTRICT may require additional coverage to be purchased by CONTRACTOR to restore the required limits. CONTRACTOR may combine primary, umbrella, and as broad as possible excess liability coverage to achieve the total limits indicated above. Any umbrella or excess liability policy shall include the additional insured endorsement, products and completed operations coverage and broad form property damage described in paragraphs (d) and (e), above. To the extent that the umbrella insurer requires notice of changes to the primary policy, notice will be considered to be given and not prejudice the DISTRICT'S rights to recover under the umbrella policy.

H. CONTRACTOR and DISTRICT release each other, and their respective authorized representatives, from any Claims (as further defined in Article 25), but only to the extent that the proceeds received from any policy of liability insurance carried by DISTRICT or CONTRACTOR, other than any self-insurance, covers any such Claim or damage. Included in any policy or policies of liability insurance provided by CONTRACTOR hereunder shall be a standard waiver of rights of subrogation against DISTRICT by the insurance company issuing said policy or policies.

I. If coverage is written on a "claims made" basis, the Certificate of Insurance shall clearly so state. In addition to the coverage requirements specified above, such policy shall provide that:

1) The policy retroactive date coincides with or precedes CONTRACTOR'S commencement of work under the Contract (including subsequent policies purchased as renewals or replacements).

2) CONTRACTOR will make every effort to maintain similar insurance during the required extended period of coverage following expiration of the Contract, including the requirement of adding all additional insureds.

3) If insurance is terminated for any reason, CONTRACTOR shall purchase an extended reporting provision of at least two (2) years to report claims arising in connection with the Contract.

4) The policy allows for reporting of circumstances or incidents that might give rise to future claims.

J. CONTRACTOR'S failure to procure the insurance specified herein, or failure to deliver certified copies or appropriate certificates of such insurance, or failure to make the premium payments required by such insurance, shall constitute a material breach of the Contract, and DISTRICT may, at its option, terminate the Contract for any such default by CONTRACTOR.

K. The requirements as to the types and limits of insurance coverage set forth herein and in the Special Conditions to be maintained by the CONTRACTOR, and any approval of said insurance by the DISTRICT or its insurance advisor(s), are not intended to and shall not in any manner limit or qualify the liabilities and obligations otherwise assumed by the CONTRACTOR pursuant to the Agreement, including, but not limited to, the provisions concerning indemnification.

L. DISTRICT shall retain the right at any time to review the coverage, form, and amount of insurance required herein and may require CONTRACTOR to obtain insurance reasonably sufficient in coverage, form, and amount to provide adequate protection against the kind and extent of risk which exists at the time a change in insurance is required.

M. All deviations from the contractual insurance requirements stated herein must be approved in writing by DISTRICT'S risk manager.

Article 22. AUTOMOBILE LIABILITY INSURANCE

CONTRACTOR shall take out and maintain at all times during the term of this Contract Automobile Liability Insurance in the amount of at least one million dollars ($1,000,000). Such insurance shall provide coverage for bodily injury and property damage including coverage for non-owned and hired vehicles, in a form and with insurance companies acceptable to the DISTRICT.

Article 23. BUILDER'S RISK/APPLICABLE INSTALLATION/FIRE INSURANCE

A. It is the CONTRACTOR'S responsibility to maintain or cause to be maintained builder's risk insurance or applicable installation coverage on all work, material, equipment, appliances, tools, and structures which are a part of the Contract and subject to loss or damage by fire, extended coverage, and vandalism and malicious mischief. DISTRICT accepts no responsibility until the Contract is formally accepted by the Governing Board for the Work. The CONTRACTOR is required to file with the DISTRICT a certificate evidencing builder's risk or applicable installation of not less than the amount identified in the Special Conditions insurance coverage.

B. Provide insurance coverage on completed value form, all-risk, or special causes of loss coverage.

1) Insurance policies shall be so conditioned as to cover the performance of any extra work performed under the Contract.
2) Coverage shall include all materials stored on site and in transit.
3) Coverage shall include CONTRACTOR'S tools and equipment.
4) Insurance shall include boiler, machinery, and material hoist coverage.

C. Company or companies providing insurance coverage shall be acceptable to the DISTRICT and authorized to conduct business in the State of California.

Article 24. PROOF OF CARRIAGE OF INSURANCE

A. Any insurance carrier providing insurance coverage required by the Contract Documents shall be admitted to and authorized to do business in the State of California unless waived, in writing, by the DISTRICT Risk Manager. Carrier(s) shall have an A.M. Best rating of not less than an A:VIII. Insurance deductibles or self-insured retentions must be declared by the CONTRACTOR, and such deductibles and retentions shall have the prior written consent from the DISTRICT. At the election of the DISTRICT, the CONTRACTOR shall either 1) reduce or eliminate such deductibles or self-insured retentions, or 2) procure a bond which guarantees payment of losses and related investigations, claims administration, and defense costs and expenses.

B. CONTRACTOR shall cause its insurance carrier(s) to furnish the DISTRICT with either 1) a properly executed original Certificates(s) of Insurance and certified original copies of Endorsements effecting coverage as required herein, or 2) if requested to do so in writing by the DISTRICT Risk Manager, provide original certified copies of policies including all endorsements and all attachments thereto, showing such insurance is in full force and effect. The DISTRICT, its directors and officers, employees, agents, or representatives shall be named as additional insureds and a waiver of subrogation shall be provided in favor of those parties. Further, said Certificates(s) and policies of insurance shall contain the covenant of the insurance carrier(s) that shall provide no less than thirty (30) days written notice be given to the DISTRICT prior to any material modification or cancellation of such insurance. In the event of a material modification or cancellation of coverage, the DISTRICT may terminate or stop the Work pursuant to the Contract Documents, unless the DISTRICT receives, prior to such effective date, another properly executed original Certificate of Insurance and original copies of endorsements or certified original policies, including all endorsements and attachments thereto evidencing the coverage set forth herein and the insurance required herein is in full force and effect. CONTRACTOR shall not take possession, or use the Project site, or commence operations under this Contract until the DISTRICT has been furnished original Certificate(s) of Insurance and certified original copies of endorsements or policies of insurance, including all endorsements and any and all other attachments as required in this Section. The original Endorsements for each policy and the Certificate of Insurance shall be signed by an individual authorized by the insurance carrier to do so on its behalf.

C. It is understood and agreed to by the parties hereto and the insurance company(ies), that the Certificate(s) of Insurance and policies shall so covenant and shall be construed as primary, and the DISTRICT'S insurance and/or deductibles and/or self-insured retentions or self-insured programs shall not be construed as contributory.

D. The DISTRICT reserves the right to adjust the monetary limits of insurance coverage during the term of this Contract, including any extension thereof, if in the DISTRICT'S reasonable judgment, the amount or type of insurance carried by the CONTRACTOR becomes inadequate.

E. CONTRACTOR shall pass down the insurance obligations contained herein to all tiers of sub-contractors working under this Contract.

Article 25. INDEMNIFICATION

CONTRACTOR shall defend (with counsel of DISTRICT'S choosing), indemnify and hold the DISTRICT, its officials, officers, agents, employees, and representatives free and harmless from any and all claims, demands, causes of action, costs, expenses, liabilities, losses, damages or injuries, in law or equity, regardless of whether the allegations are false, fraudulent, or groundless, to property or persons, including wrongful death, to the extent arising out of or incident to any act, omission, breach, or willful misconduct of CONTRACTOR, its officials, officers, employees, agents, consultants, and CONTRACTORS arising out of or in connection with the performance of the Work or this Contract, including claims made by Subcontractors for nonpayment, including without limitation the payment of all consequential damages and attorneys' fees and other related costs and expenses. CONTRACTOR shall defend, at CONTRACTOR'S own cost, expense, and risk, with counsel of DISTRICT'S choosing, any and all such aforesaid suits, actions, or other legal proceedings of every kind that may be brought or instituted against the DISTRICT, its officials, officers, agents, employees and representatives. To the extent of its liability, CONTRACTOR shall pay and satisfy any judgment, award, or decree that may be rendered against DISTRICT, its officials, officers, employees, agents, employees, and representatives, in any such suit, action or other legal proceeding. CONTRACTOR shall reimburse DISTRICT, its officials, officers, agents, employees, and representatives for any and all legal expenses and costs incurred by each of them in connection therewith or in enforcing the indemnity herein provided. The only limitations on this provision shall be those imposed by Civil Code Section 2782.

Article 26. LAWS AND REGULATIONS

A. CONTRACTOR shall give all notices and comply with all laws, ordinances, rules, and regulations bearing on conduct of the Work as indicated and specified. If CONTRACTOR observes that drawings and specifications are at variance therewith, he shall promptly notify the DISTRICT in writing and any necessary changes shall be adjusted as provided in contract for changes in the Work. If CONTRACTOR performs any work knowing it to be contrary to such laws, ordinances, rules, and regulations, and without such notice to DISTRICT, he shall bear all costs arising therefrom.

B. CONTRACTOR shall be responsible for familiarity with the Americans with Disabilities Act (ADA) (42 USC 12101 et seq.). Installations of equipment and other devices shall be in compliance with ADA regulations.

Article 27. PERMITS AND LICENSES

Permits and licenses necessary for prosecution of The Work shall be secured and paid for by CONTRACTOR, unless otherwise specified in the Contract Documents.

A. CONTRACTOR shall obtain and pay for all other permits and licenses required for the Work, including excavation permit and for plumbing, mechanical and electrical work and for operations in or over public streets or right of way under the jurisdiction of public agencies other than the DISTRICT.

B. The CONTRACTOR shall arrange and pay for all off-site inspection of the Work related to permits and licenses, including certification, required by the specifications, drawings, or by governing authorities, except for such off-site inspections delineated as the DISTRICT'S responsibility pursuant to the Contract Documents.

C. Before acceptance of the Project, the CONTRACTOR shall submit all licenses, permits, certificates of inspection, and required approvals to the DISTRICT.

Article 28. INSPECTION FEES FOR PERMANENT UTILITIES

All inspection fees, and other municipal charges for permanent utilities including, but not limited to, sewer, electrical, phone, gas, water, and irrigation shall be paid for by DISTRICT. CONTRACTOR shall be responsible for arranging the payment of such fees, but inspection fees and other municipal fees relating to permanent utilities shall be paid by DISTRICT. CONTRACTOR may either request reimbursement from DISTRICT for such fees or obtain the funds from DISTRICT prior to paying such fees.

Article 29. EASEMENTS

Easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the DISTRICT, unless otherwise specified.

Article 30. SURVEYS

Surveys to determine locations property lines and corners, construction, grading, utilities, structures, site work and any other necessary survey, shall be provided by the CONTRACTOR.

Article 31. EXCISE TAXES

If under federal excise tax law any transaction hereunder constitutes a sale on which a federal excise tax is imposed and the sale is exempt from such excise tax because it is a sale to a state or local government for its exclusive use, the DISTRICT, upon request, will execute a certificate of exemption which will certify (1) that the DISTRICT is a political subdivision of the state for the purposes of such exemption, and (2) that the sale is for the exclusive use of the DISTRICT. No excise tax for such materials shall be included in any bid price.

Article 32. PATENTS, ROYALTIES, AND INDEMNITIES

The CONTRACTOR shall hold and save the DISTRICT and its officers, agents, and employees harmless from liability of any nature or kind, including cost and expense, for or on account of any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of this contract, including its use by the DISTRICT, unless otherwise specifically stipulated in the contract documents.

Article 33. MATERIALS

A. Except as otherwise specifically stated in this contract, CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, temporary constructions of every nature, and all other services and facilities of every nature whatsoever necessary to execute and complete this Contract within specified time.

B. Unless otherwise specified, all materials shall be new and both workmanship and materials shall be of good quality.

C. Materials shall be furnished in ample quantities and at such times as to ensure uninterrupted progress of work and shall be stored properly and protected as required. CONTRACTOR shall be entirely responsible for damage or loss by weather or other causes to materials or work under this contract.

D. No materials, supplies, or equipment for Work under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale or other agreement by which an interest therein or in any part thereof is retained by seller or supplier. CONTRACTOR warrants good title to all material, supplies, and equipment installed or incorporated in work and agrees upon completion of all Work to deliver premises, together with all improvements and appurtenances constructed or placed thereon by him, to DISTRICT free from any claims, liens, or charges. CONTRACTOR further agrees that neither he nor any person, firm, or corporation furnishing any materials or labor for any Work covered by this Contract shall have any right to a lien upon premises or any improvement or appurtenance thereon, except that CONTRACTOR may install metering devices or other equipment of utility companies or of political subdivisions, title to which is commonly retained by the utility company or political subdivision. In event of installation of any such metering device or equipment, CONTRACTOR shall advise DISTRICT as to owner thereof. Nothing contained in this article, however, shall defeat or impair right of persons furnishing material or labor under any bond given by CONTRACTOR for their protection or any rights under any law permitting such persons to look to funds due to CONTRACTOR in the hands of the DISTRICT, and this provision shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing material for work when no formal contract is entered into for such material.

E. Materials shall be stored on the Project site in such manner so as not to interfere with any operations of the DISTRICT or any independent CONTRACTOR.

Article 34. SUBSTITUTION AFTER CONTRACT IS AWARDED

A. Pursuant to Public Contract Code Section 3400(b) the DISTRICT may make a finding that is described in the invitation for bids that designates certain products, things, or services by specific brand or trade name.

B. Refer to Section 19 of the Information for Bidders.

Article 35. SHOP DRAWINGS

A. CONTRACTOR shall check and verify all field measurements and shall submit with such promptness as to cause no delay in his own Work or in that of any other CONTRACTOR, Subcontractor, DISTRICT, other independent CONTRACTOR or worker on the Project, one (1) digital copy and three (3) hard copies of all shop or setting drawings, schedules, and materials list, and all other submittals in accordance with other provisions of the contract required for the work of various trades. CONTRACTOR shall sign all submittals affirming that submittals have been reviewed and approved by CONTRACTOR prior to submission to DISTRICT. Each signed submittal shall affirm that the submittal meets all the requirements of the Contract Documents except as specifically and clearly noted and listed on the cover sheet of the submittal.

B. CONTRACTOR shall advise DISTRICT immediately, if DISTRICT has not checked and approved with reasonable promptness, such schedules and drawings for conformance with the design concept of the Project and compliance with information given in the Contract Documents. CONTRACTOR shall make any corrections required by DISTRICT, file with him (1) digital copy and three (3) corrected hard copies and furnish such other copies as may be needed for construction. DISTRICT'S approval of such drawings or schedules also shall not relieve CONTRACTOR from responsibility for deviations from drawings or specifications unless he has in writing called the DISTRICT'S attention to such deviations at time of submission and has secured his written approval. The DISTRICT'S approval of such drawings and schedules also shall not relieve CONTRACTOR from responsibility for errors in shop drawings or schedules. For purposes of this Section "reasonable promptness" shall mean such reasonable promptness as to cause no delay in the Work or in the activities of the DISTRICT, CONTRACTOR, or separate CONTRACTORS, while allowing sufficient time in the DISTRICT'S professional judgment to permit adequate review.

Article 36. SUBMITTALS

A. CONTRACTOR shall furnish for approval, within seven (7) days following award of the Contract, a log of all samples, material lists and certifications, mix designs, schedules, and other submittals, as required in the specifications. Such log shall indicate whether samples will be provided as specified and in accordance with other provisions of this Contract.

B. CONTRACTOR will provide samples and submittals, together with catalogs and supporting data required by DISTRICT within a reasonable time period so as not to cause delays on the Project.

C. This provision shall not authorize any extension of time for performance of this Contract. The DISTRICT representative will check and approve such samples only for conformance with the design concept of the Work and for compliance with information given in Contract Documents. Work shall be in accordance with approved samples. DISTRICT action will be taken within ten (10) calendar days after receiving such samples and submittals. If in the DISTRICT'S professional judgment ten (10) days is an insufficient amount of time to permit adequate review, DISTRICT shall, within the initial ten (10) day period, notify the CONTRACTOR, with a copy to the Inspector and the DISTRICT, of the amount of time that will be required to respond.

D. If the DISTRICT'S response results in a change in the Project, then such change shall be affected by a written change order.

Article 37. CLOSEOUT SUBMITTALS

The CONTRACTOR shall be responsible for the timely delivery of the technical manuals, warranties and guarantees as required in the technical specifications. The final payment will not be made until the DISTRICT representative has had an opportunity to review and accept the required documents.

Article 38. COST BREAKDOWN AND PERIODICAL ESTIMATES

A. CONTRACTOR shall furnish on forms approved by DISTRICT:

1) Within seven (7) calendar days of award of the Contract a detailed Schedule of Values giving a complete breakdown of the Contract price; and

2) A periodical itemized estimate of work done for the purpose of making partial payments thereon;

3) Within ten (10) calendar days of request by DISTRICT, a schedule of estimated monthly payments which shall be due him under the Contract.

B. Values employed in making up any of these schedules will be used only for determining basis of partial payments and will not be considered as fixing a basis for additions to or deductions from the Contract price.

Article 39. PAYMENTS AND RETENTION

A. Each month as soon as practicable after receipt of approved periodical estimate for partial payment, but in order to avoid the payment of interest, in any event within thirty (30) days of receipt of such periodical estimate, there shall be paid to CONTRACTOR a sum equal to ninety-five percent (95%) of the value of work performed up to the last day of the previous month, less the aggregate of previous payments. Upon receipt of a notarized payment request, the DISTRICT shall as soon as practicable determine whether the payment request is proper. If the request is determined not to be a proper payment request suitable for payment, it shall be returned to the CONTRACTOR as soon as practicable within seven (7) days after receipt and shall be accompanied by a statement in writing as to the reasons why the payment request is not proper. Monthly payments shall be made only on the basis of monthly estimates which shall be prepared by CONTRACTOR on a form approved by the DISTRICT and filed before the fifth (5th) day of the month during which payment is to be made. Work completed as estimated shall be an estimate only and no inaccuracy or error in said estimate shall operate to release CONTRACTOR or any bondsman from damages arising from such Work or from enforcing each and every provision of this Contract and DISTRICT shall have the right subsequently to correct any error made in any estimate for payment. CONTRACTOR shall not be entitled to have any payment estimates processed or be entitled to have any payment made for Work performed so long as any lawful or proper direction given by the DISTRICT concerning the Work, or any portion thereof, remains not complied with.

B. The final payment of five percent (5%) of the value of work done under this Contract, if unencumbered, shall be made within sixty (60) days after the date of final completion of the Work as provided in Public Contract Code Section 7107, provided however, that in the event of a dispute between the DISTRICT and the CONTRACTOR, the DISTRICT may withhold from the final payment an amount not to exceed one hundred and fifty percent (150%) of the disputed amount. Completion means any of the following as provided by Public Contract Code Section 7107:

1) The occupation, beneficial use, and enjoyment of a work of improvement, excluding any operation only for testing, startup, or commissioning, by the public agency, or its agent, accompanied by cessation of labor on the work of improvement.

2) The acceptance by the public agency, or its agent, of the work of improvement. For purposes of this Contract, the acceptance by the DISTRICT means acceptance made only by an action of the governing body of DISTRICT in session. Acceptance by CONTRACTOR of said final payment shall constitute a waiver of all claims against DISTRICT arising from this contract.

3) After the commencement of a work of improvement, a cessation of labor on the work of improvement for a continuous period of 100 days or more, due to factors beyond the control of the CONTRACTOR.

4) After the commencement of a work of improvement, a cessation of labor on the work of improvement for a continuous period of 30 days or more if the public agency files for record a notice of cessation or a notice of completion.

C. This Contract is subject to the provisions of Public Contract Code Section 7107.

D. At any time after fifty percent (50%) of the work has been completed, if the DISTRICT, by action of its governing body, finds that satisfactory progress is being made, DISTRICT may make any of the remaining payments in full for actual work completed or may withhold any amount up to five percent (5%) thereof as DISTRICT may find appropriate based on the CONTRACTOR'S progress.

E. Whenever any part of the Work is in a condition suitable for use, and the best interest of the DISTRICT requires such use, the DISTRICT may take possession of, connect to, open for public use, or use a part thereof. When so used, maintenance and repairs due to ordinary wear and tear or vandalism will be made at DISTRICT'S expense. The use by the DISTRICT as contemplated in this Section shall in no case be construed as constituting acceptance of the Work or any part thereof. Such use shall neither relieve the CONTRACTOR of any of his responsibilities under the Contract nor act as a waiver by the DISTRICT of any of the conditions thereof. CONTRACTOR shall continue to maintain all insurance, including Builder's Risk insurance, on the Project through final completion of the Project.

Article 40. PAYMENTS WITHHELD

In addition to amounts which the DISTRICT may retain under other provisions of the Contract Documents, the DISTRICT may withhold payments due to CONTRACTOR as may be necessary to cover:

A. Stop Payment Notice Claims.

B. Defective work not remedied.

C. Failure of CONTRACTOR to make proper payments to its Subcontractors or suppliers.

D. Completion of the Contract if there exists a reasonable doubt that the Work can be completed for balance then unpaid.

E. Damage to another CONTRACTOR or third party.

F. Amounts which may be due the DISTRICT for claims against CONTRACTOR.

G. Failure of CONTRACTOR to keep the record ("as-built") drawings up to date.

H. Failure to provide updates on the construction schedule.

I. Site clean-up.

J. Failure of the CONTRACTOR to comply with requirements of the Contract Documents.

K. Liquated damages.

L. Legally permitted penalties.

Upon completion of the Contract, the DISTRICT will reduce the final Contract amount to reflect costs charged to the CONTRACTOR, back charges, or payments withheld pursuant to the Contract Documents.

DISTRICT may apply such withheld amount or amounts to payment of such claims or obligations at its discretion. In so doing, DISTRICT shall be deemed the agent of CONTRACTOR and any payment so made by DISTRICT shall be considered as a payment made under the Contract by DISTRICT to CONTRACTOR and DISTRICT shall not be liable to CONTRACTOR for such payments made in good faith. Such payments may be made without prior judicial determination of claim or obligations. DISTRICT will render CONTRACTOR a proper accounting of such funds disbursed on behalf of CONTRACTOR.

Article 41. CHANGES AND EXTRA WORK

A. Change Order Work.

1) The DISTRICT, without invalidating the Contract, may order changes in the Work consisting of additions, deletions or other revisions, the Contract amount and Contract time being adjusted accordingly. All such changes in the Work shall be authorized by Change Order and shall be performed under the applicable conditions of the Contract Documents. A Change Order signed by the CONTRACTOR indicates the CONTRACTOR'S agreement therewith, including any adjustment in the Contract amount or the Contract time, and the full and final settlement of all costs (direct, indirect, and overhead) related to the Work authorized by the Change Order.

2) All claims for additional compensation to the CONTRACTOR shall be presented in writing before the expense is incurred and will be adjusted as provided herein. No work shall be allowed to lag pending such adjustment, but shall be promptly executed as directed, even if a dispute arises. No claim will be considered after the Work in question has been done unless a written contract change order has been issued or a timely written notice of claim has been made by CONTRACTOR. CONTRACTOR shall not be entitled to claim or bring suit for damages, whether for loss of profits or otherwise, on account of any decrease or omission of any item or portion of Work to be done. Whenever any change is made as provided for herein, such change shall be considered and treated as though originally included in the Contract, and shall be subject to all terms, conditions, and provisions of the original Contract.

3) DISTRICT Initiated Change. The CONTRACTOR must submit a complete cost proposal, including any change in the Contract time, within seven (7) days after receipt of a scope of a proposed change order, unless the DISTRICT requests that proposals be submitted in less than seven (7) days.

4) CONTRACTOR Initiated Change. The CONTRACTOR must give written notice of a proposed change order required for compliance with the Contract Documents within seven (7) days of discovery of the facts giving rise to the proposed change order.

5) Whenever possible, any changes to the Contract amount shall be in a lump sum mutually agreed to by the CONTRACTOR and the DISTRICT.

6) Price quotations from the CONTRACTOR shall be accompanied by sufficiently detailed supporting documentation to permit verification by the DISTRICT.

7) If the CONTRACTOR fails to submit the cost proposal within the seven (7) day period (or as requested), the DISTRICT has the right to order the CONTRACTOR in writing to commence the Work immediately on a force account basis and/or issue a lump sum change to the Contract price in accordance with the DISTRICT'S estimate of cost. If the change is issued based on the DISTRICT estimate, the CONTRACTOR will waive its right to dispute the action unless within fifteen (15) days following completion of the added/deleted work, the CONTRACTOR presents written proof that the DISTRICT'S estimate was in error.

8) Estimates for lump sum quotations and accounting for cost-plus-percentage work shall be limited to direct expenditures necessitated specifically by the subject extra work, and shall be segregated as follows:

(a) Labor. The costs of labor will be the actual cost for wages prevailing locally for each craft or type of worker at the time the extra work is done, plus employer payments of payroll taxes and insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from Federal, State, or local laws, as well as assessment or benefits required by lawful collective bargaining agreements. The use of a labor classification which would increase the extra work cost will not be permitted unless the CONTRACTOR establishes the necessity for such additional costs. Labor costs for equipment operators and helpers shall be reported only when such costs are not included in the invoice for equipment rental.

(b) Materials. The cost of materials reported shall be at invoice or the lowest current price at which such materials are locally available in the quantities involved, plus sales tax, freight, and delivery. Materials cost shall be based upon supplier or manufacturer's invoice. If invoices or other satisfactory evidence of cost are not furnished within fifteen (15) days of delivery, then the DISTRICT Representative shall determine the materials cost, at its sole discretion.

(c) Tool and Equipment Use. No payment will be made for the use of small tools, tools which have a replacement value of $1,000 or less. Regardless of ownership, the rates to be used in determining equipment use costs shall not exceed listed rates prevailing locally at equipment rental agencies, or distributors, at the time the Work is performed.

(d) Overhead, Profit and Other Charges. The mark-up for overhead (including supervision) and profit on Work added to the Contract shall be according to the following:

i) "Net Cost" is defined as consisting of costs of labor, materials, and tools and equipment only excluding overhead and profit. The costs of applicable insurance and bond premium will be reimbursed to the CONTRACTOR and Subcontractors at cost only, without mark-up.

ii) For Work performed by the CONTRACTOR'S forces the added cost for overhead and profit shall not exceed ten (10%) percent of the Net Cost of the Work.

iii) For Work performed by a Subcontractor, the added cost for overhead and profit shall not exceed ten (10%) percent of the Net Cost of the Work to which the CONTRACTOR may add five (5%) percent of the Subcontractor's Net Cost.

iv) For Work performed by a sub-Subcontractor the added cost for overhead and profit shall not exceed ten (10 %) percent of the Net Cost for Work to which the Subcontractor and general CONTRACTOR may each add an additional five (5 %) percent of the Net Cost of the lower tier Subcontractor.

v) No additional mark-up will be allowed for lower tier Subcontractors, and in no case shall the added cost for overhead and profit payable by DISTRICT exceed twenty (20%) percent of the Net Cost as defined herein.

vi) All costs for CONTRACTOR'S bonds and insurance shall not exceed one (1%) percent of the Net Cost as defined herein.

9) For added or deducted Work by Subcontractors, the CONTRACTOR shall furnish to the DISTRICT the Subcontractor's signed detailed estimate of the cost of labor, material, and equipment, including the Subcontractor markup for overhead and profit. The same requirement shall apply to sub-subcontractors.

10) For added or deducted work furnished by a vendor or supplier, the CONTRACTOR shall furnish to the DISTRICT a detailed estimate or quotation of the cost to the CONTRACTOR, signed by such vendor or supplier.

11) Any change in the Work involving both additions and deletions shall indicate a net total cost, including subcontracts and materials. Allowance for overhead and profit, as specified herein, shall be applied if the net total cost is an extra; overhead and profit allowances shall not be applied if the net total cost is a credit. The estimated cost of deductions shall be based on labor and material prices on the date the Contract was executed.

12) CONTRACTOR shall not reserve a right to assert impact costs, extended job site costs, extended overhead, constructive acceleration and/or actual acceleration beyond what is stated in the change order for work. No claims shall be allowed for impact, extended overhead costs, constructive acceleration and/or actual acceleration due to a multiplicity of changes and/or clarifications. The CONTRACTOR may not change or modify the DISTRICT'S change order form in an attempt to reserve additional rights.

13) If the DISTRICT disagrees with the proposal submitted by CONTRACTOR, it will notify the CONTRACTOR and the DISTRICT will provide its opinion of the appropriate price and/or time extension. If the CONTRACTOR agrees with the DISTRICT, a change order will be issued by the DISTRICT. If no agreement can be reached, the DISTRICT shall have the right to issue a unilateral change order setting forth its determination of the reasonable additions or savings in costs and time attributable to the extra or deleted work. Such determination shall become final and binding if the CONTRACTOR fails to submit a claim in writing to the DISTRICT within fifteen (15) days of the issuance of the unilateral change order, disputing the terms of the unilateral change order.

14) No dispute, disagreement, or failure of the parties to reach agreement on the terms of the change order shall relieve the CONTRACTOR from the obligation to proceed with performance of the Work, including extra work, promptly and expeditiously.

15) Any alterations, extensions of time, extra work or any other changes may be made without securing consent of the CONTRACTOR'S surety or sureties.

16) At the conclusion of the Work the unused remainder of the DISTRICT'S Allowance shall be returned to the DISTRICT by means of deductive Change Order. For example, if during the duration of the Project $50,000 of the DISTRICT'S Allowance is utilized for Change Order work under Article 41, then CONTRACTOR shall execute a deductive Change Order for $50,000 representing the unused portion of the Owner's Allowance.

Article 42. DEDUCTIONS FOR UNCORRECTED WORK

If DISTRICT deems it inexpedient to correct work injured or not done in accordance with the Contract, an equitable deduction from the Contract price shall be made therefore.

Article 43. PAYMENTS BY CONTRACTOR

CONTRACTOR shall pay:

A. For all transportation and utility services, not later than the twentieth (20th) day of the calendar month following that in which such services are rendered,

B. For all materials, tools, and other expendable equipment to the extent of ninety-five percent (95%) of cost thereof, not later than the twentieth (20th) day of the calendar month following that in which such materials, tools, and equipment are delivered at the site of the Project and balance of cost thereof not later than the thirtieth (30th) day following completion of that part of Work in or on which such materials, tools, and equipment are incorporated or used, and

C. To each of his Subcontractors, not later than the fifth (5th) day following each payment to CONTRACTOR, the respective amounts allowed CONTRACTOR on account of work performed by respective Subcontractor to the extent of such Subcontractor's interest therein. The CONTRACTOR shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-Subcontractors in a similar manner.

Article 44. CONTRACTOR'S SUPERVISION

A. Unless personally present on the premises where the Work is being done, CONTRACTOR shall keep on the Work, during its progress, a competent full-time job (project) superintendent satisfactory to DISTRICT. The job superintendent shall not be changed except with the written consent of the DISTRICT unless the job superintendent proves to be unsatisfactory to CONTRACTOR and ceases to be in his employ. The job superintendent shall represent CONTRACTOR in his absence and all directions given to him shall be as binding as if given to CONTRACTOR. Other directions shall be so confirmed on written request in each case.

B. CONTRACTOR shall give efficient supervision to the Work, using his best skill and attention to control safety and job coordination. He shall carefully study and compare all drawings, specifications, and other instructions and shall at once report to DISTRICT any error, inconsistency, or omission which he may discover. The CONTRACTOR shall not be liable to DISTRICT for any damage resulting from errors or deficiencies in the Contract Documents or other instructions by the DISTRICT.

Article 45. INSPECTOR'S FIELD OFFICE

CONTRACTOR may be required to establish a field office, at the DISTRICT'S discretion. When required by provisions set forth in the bid documents: (refer to Special Conditions)

A. CONTRACTOR shall provide for the use of the inspector a separate trailer or temporary private office of not less than seventy-five square feet of floor area to be located as directed by the inspector and to be maintained until removal is authorized by DISTRICT. The field office shall be of substantial waterproof construction with adequate natural light and ventilation by means of stock design windows. Door shall have a key-type lock or padlock hasp. The inspector's field office shall have heating and air-conditioning and shall be equipped with a telephone, a telephone answering machine, a fax machine, internet, and use of an on-site copier at CONTRACTOR'S expense.

B. A table satisfactory for the study of plans and two (2) chairs shall be provided by CONTRACTOR. CONTRACTOR shall provide and pay for adequate electric lights, local telephone service, and adequate heat and air conditioning for the field office until authorized removal.

C. The provisions of this Section are intended to be complementary to any requirements provided elsewhere in these Contract Documents. However, in the event of conflicts between this Section and other provisions of these Contract Documents, this Section shall prevail.

Article 46. DOCUMENTS ON WORK

A. CONTRACTOR shall keep one copy of all Contract Documents, including addenda, change orders, Division I, Title 21 of the California Code of Regulations, Parts 1-5 and 12 of Title 24 of the California Code of Regulations, and the prevailing wage rates applicable at the time of the Contract, which are a part of Contract Documents, on the job at all times. Said documents shall be kept in good order and shall be available to the DISTRICT and DISTRICT representative. CONTRACTOR shall be acquainted with and comply with the provisions of said Titles 21 and 24 as they relate to this Project. (See particularly Duties of the CONTRACTOR, Title 24 California Code of Regulations, Section 4-343.) CONTRACTOR shall also be acquainted with and comply with all California Code of Regulations provisions relating to this project, particularly Titles 17, 19, 21, and 24.

B. CONTRACTOR shall also make available all books, records, accounts, contracts, bids, etc. upon request by the DISTRICT.

Article 47. RECORD ("AS BUILT") DRAWINGS

A. CONTRACTOR shall maintain a clean, undamaged set of Contract drawings and shop drawings. In addition to maintaining one complete set of record drawings (herein referred to as "as-builts"), CONTRACTOR shall require each trade to do its own as-builts. The trade as-builts shall contain information showing clean and clear drawings with horizontal and vertical controls suitable for conversion to electronic media. Graphic quality must be equal to clean and clear original drawings; adequacy of the drawings shall be determined by the DISTRICT'S representative or the DISTRICT. CONTRACTOR shall mark the set to show the actual installation where the installation varies from the Work as originally shown. CONTRACTOR shall mark whichever drawings are most capable of showing conditions fully and accurately where shop drawings are used and shall record a cross-reference at the corresponding location on the Contract drawings. CONTRACTOR shall give particular attention to concealed elements that would be difficult to measure and record at a later date. CONTRACTOR shall use colors to distinguish variations in separate categories of the work.

B. CONTRACTOR shall note related change order numbers where applicable. CONTRACTOR shall organize record drawings sheets into manageable sets, bound with durable paper cover sheets and shall print suitable title, dates and other identification on the cover of each set.

C. At the end of the Project, the CONTRACTOR shall provide the DISTRICT representative with a complete set of as-built drawings. The complete set shall contain information showing clean and clear drawings with horizontal and vertical controls suitable for conversion to electronic media. Graphic quality must be equal to clean and clear original drawings; adequacy of the drawings shall be determined by the DISTRICT'S representative or DISTRICT. The as-builts must show the entire site for each major trade, including but not limited to water, sewer, electrical, data, telephone, cable, fire, alarm, gas, and plumbing.

Article 48. UTILITY USAGE

A. All temporary utilities, including but not limited to electricity, water, gas, and telephone used on work shall be furnished and paid for by CONTRACTOR. CONTRACTOR shall furnish and install necessary temporary distribution systems, including meters, if necessary, from distribution points to points on site where utility is necessary to carry on the Work. Upon completion of the Work, CONTRACTOR shall remove all temporary distribution systems.

B. CONTRACTOR shall provide necessary and adequate utilities and pay all costs for water, electricity, gas, oil, and sewer charges required for completion of the Project.

C. All permanent meters installed shall be listed in the CONTRACTOR'S name until completion occurs, as defined in Article 6 hereof, at which time further pro-rating will be determined if necessary. When the DISTRICT begins using the Project, charges over and above power actually used for construction will be the responsibility of the DISTRICT.

D. If the Contract is for construction in existing facilities, CONTRACTOR may, with written permission of the DISTRICT, use the DISTRICT'S existing utilities by making prearranged payments to the DISTRICT for utilities used by CONTRACTOR for construction.

Article 49. SANITARY FACILITIES

CONTRACTOR shall provide sanitary temporary toilet buildings for the use of all workers. All toilets shall comply with local codes and ordinances. Toilets shall be kept supplied with toilet paper and shall have workable door fasteners. Toilets shall be serviced no less than once weekly and shall be present in a quantity of not less than 1 per 20 workers as required by CAL-OSHA regulation. The toilets shall be maintained in a sanitary condition at all times. Use of toilet facilities in The Work under construction shall not be permitted. Any other sanitary facilities required by CAL-OSHA shall be the responsibility of the CONTRACTOR.

Article 50. TRENCHES AND EXCAVATION

A. Trenches and Excavations Five Feet or More in Depth. The CONTRACTOR shall submit to the DISTRICT, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during the excavation of any trench or trenches five feet or more in depth. If the plan varies from shoring system standards, the plan shall be prepared by a registered civil or structural engineer. The plan shall not be less effective than the shoring, bracing, sloping, or other provisions of the Construction Safety Orders, as defined in the California Code of Regulations. The CONTRACTOR shall not commence any excavation work until it has secured all necessary permits including the required CAL OSHA excavation/shoring permit. Any permits shall be prominently displayed on the site prior to the commencement of any excavation.

B. Trenches and Excavations Deeper than Four Feet. If Work under this Contract involves digging trenches or other excavation that extends deeper than four feet below the surface, CONTRACTOR shall promptly, and before the following conditions are disturbed, notify the DISTRICT, in writing, of any:

1) Material that the CONTRACTOR believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

2) Subsurface or latent physical conditions at the site differing from those indicated, including geological, soils, or water table issues that impede construction or increase the construction cost.

3) Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents.

The DISTRICT shall promptly investigate the conditions, and if it finds that the conditions do so materially differ, or do involve hazardous waste, and cause a decrease or increase in CONTRACTOR'S cost of, or the time required for, performance of any part of the Work, shall issue a change order under the procedures described in these General Conditions. If asbestos-related work or hazardous substance removal is required that is not disclosed in the Contract Documents, such work shall be performed pursuant to a contract separate from any other Work to be performed as required by Section 25914.2 of the Health and Safety Code, as may be amended from time to time.

In the event that a dispute arises between the DISTRICT and the CONTRACTOR as to whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the CONTRACTOR'S cost of, or time required for, performance of any part of the Work, the CONTRACTOR shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all Work to be performed under the Contract. CONTRACTOR shall retain any and all rights provided either by Contract or by law which pertain to the resolution of disputes and protests between the parties.

Article 51. PROTECTION OF WORK AND PROPERTY

A. The CONTRACTOR shall be responsible for all damages to persons or property that occur as a result of his fault or negligence arising from or in connection with the prosecution of this Contract. CONTRACTOR shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance by the DISTRICT. All work shall be solely at the CONTRACTOR'S risk. CONTRACTOR shall adequately protect adjacent property from settlement or loss of lateral support as provided by law and the Contract Documents. CONTRACTOR shall take all necessary precautions for the safety of employees on the project and shall comply with all applicable safety laws and building codes to prevent accidents or injury to persons on, about, or adjacent to premises where work is being performed. CONTRACTOR shall erect and properly maintain at all times, as required by conditions and progress of work, all necessary safeguards, signs, barriers, lights, and watchmen for protection of workers and the public and shall post danger signs warning against hazards created by such features in the course of construction. CONTRACTOR shall designate a responsible member of his organization on the Work, whose duty shall be prevention of accidents. The name and position of the person so designated shall be reported to the DISTRICT by CONTRACTOR.

B. In an emergency affecting safety of life or of work or of adjoining property, CONTRACTOR, without special instruction or authorization from the DISTRICT, is hereby permitted to act, at his discretion, to prevent such threatened loss or injury, and he shall so act, without appeal, if so authorized or instructed by the DISTRICT. Any compensation claimed by CONTRACTOR on account of emergency work shall be determined by agreement.

C. CONTRACTOR shall provide such heat, covering, and enclosures as are necessary to protect all work, materials, equipment, appliances, and tools against damage by weather conditions.

D. CONTRACTOR shall take adequate precautions to protect existing sidewalks, curbs, pavements, utilities, adjoining property, and structures, and to avoid damage thereto, and repair any damage thereto caused by construction operations. CONTRACTOR shall:

1) Enclose the working area with a substantial barricade, arrange work to cause minimum amount of inconvenience and danger to students and faculty in their regular school activities, and perform work which so to not interfere with school routine before or after school hours. (This sub-section applies to new construction on existing sites.)

2) Provide substantial barricades around any shrubs or trees indicated to be preserved.

3) Deliver materials to the building area over a route designated by the DISTRICT.

4) When directed by the DISTRICT, take preventive measures to eliminate objectionable dust.

5) Confine CONTRACTOR'S apparatus, the storage of materials, and the operations of his workers to limits indicated by law, ordinances, permits, or directions of DISTRICT. CONTRACTOR shall not unreasonably encumber the premises with his materials. CONTRACTOR shall enforce all instructions of the DISTRICT regarding signs, advertising, fires, danger signals, barricades, and smoking and require that all persons employed on work comply with all regulations while on the construction site.

6) Take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are disturbed by accident, they shall be replaced by an approved civil engineer or land surveyor, licensed in the State of California, at no cost to the DISTRICT.

Article 52. LAYOUT AND FIELD ENGINEERING

All field engineering required for laying out this work and establishing grades for earthwork operations shall be furnished by the CONTRACTOR at his expense. Such work shall be done by a qualified civil engineer or land surveyor licensed in California and approved by the DISTRICT. Any required "as-built" drawings of site development shall be prepared by a qualified civil engineer or land surveyor licensed in California and approved by the DISTRICT.

Article 53. REMOVAL OF HAZARDOUS MATERIALS

A. Since removal and/or abatement of asbestos, PCBs and other toxic wastes and hazardous materials is a specialized field of work with specialized insurance requirements, unless otherwise specified in the Contract Documents, the DISTRICT shall contract directly for such specialized services, if required, and shall not require the CONTRACTOR to subcontract for such services.

B. In the event the CONTRACTOR encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) which has not been rendered harmless, the CONTRACTOR shall immediately stop work in the area affected and report the condition to the DISTRICT, inspector, and DISTRICT in writing. The work in the affected area shall not thereafter be resumed except by written agreement of the DISTRICT and CONTRACTOR if in fact the material is asbestos or PCB and has not been rendered harmless. The work in the affected area shall be resumed in the absence of asbestos or PCB, or when it has been rendered harmless, by written agreement of the DISTRICT and CONTRACTOR, or by resolution pursuant to Article 71.

Article 54. CUTTING AND PATCHING

A. CONTRACTOR shall do all cutting, fitting, or patching of work as required to make its several parts come together properly and fit it to receive or be received by work of other CONTRACTORS showing upon, or reasonably implied by, the drawings and specifications for the completed structure. CONTRACTOR shall make good after them as DISTRICT may direct.

B. All cost caused by defective or ill-timed work shall be borne by party responsible, therefore.

C. CONTRACTOR shall not endanger any work by cutting, excavating, or otherwise altering work and shall not cut or alter work of any other CONTRACTOR save with consent or at the direction of the DISTRICT.

Article 55. CLEANING UP

CONTRACTOR at all times shall keep premises free from debris such as waste, rubbish, and excess materials and equipment caused by this Work. CONTRACTOR shall not leave debris under, in, or about the premises. Upon completion of the Work, CONTRACTOR shall clean the interior and exterior of the building or improvement including fixtures, equipment, walls, floors, ceilings, roofs, window sills and ledges, horizontal projections, and any areas where debris has collected so surfaces are free from foreign material or discoloration. CONTRACTOR shall clean and polish all glass, plumbing fixtures, and finish hardware and similar finish surfaces and equipment and CONTRACTOR shall also remove temporary fencing, barricades, planking, and construction toilet and similar temporary facilities from the site. See Special Conditions for additional requirements and instructions.

Article 56. CORRECTION OF WORK BEFORE FINAL PAYMENT

A. CONTRACTOR shall promptly remove from the premises all Work condemned by DISTRICT as failing to conform to the Contract Documents, whether incorporated or not. CONTRACTOR shall promptly replace and re-execute his own Work to comply with contract documents without additional expense to the DISTRICT and shall bear the expense of making good all work of other CONTRACTORS destroyed or damaged by such removal or replacement.

B. If CONTRACTOR does not remove such condemned Work within a reasonable time, fixed by written notice, DISTRICT may remove it and may store the material at CONTRACTOR'S expense. If CONTRACTOR does not pay expenses of such removal within ten (10) days' time thereafter, DISTRICT may, upon ten (10) days' written notice, sell such materials at auction or at private sale and shall account for net proceeds thereof, after deducting all costs and expenses that should have been borne by CONTRACTOR.

Article 57. ACCESS TO WORK

DISTRICT and its representatives shall at all times have access to the Work wherever it is in preparation or progress. CONTRACTOR shall provide safe and proper facilities for such access so that the DISTRICT'S representatives may perform their functions under the Contract.

Article 58. OCCUPANCY

DISTRICT reserves the right to occupy buildings at any time before completion, and such occupancy shall not constitute final acceptance of any part of the Work covered by this Contract.

Article 59. PROJECT INSPECTOR

A. If applicable, an inspector will be retained by DISTRICT in accordance with requirements of Title 24 of the California Code of Regulations and will be assigned to the work. His duties are specifically defined in Part 1, Title 24, Section 4-342 of the California Code of Regulations.

B. All work shall be under the observation of said inspector. He shall have free access to any or all parts of work at any time. CONTRACTOR shall furnish inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting progress and manner of Work and character of materials. Inspection of Work shall not relieve CONTRACTOR from any obligation to fulfill this contract. Inspector or DISTRICT shall have authority to stop Work whenever the provisions of the Contract Documents are not being complied with and CONTRACTOR shall instruct his employees accordingly.

Article 60. TESTS AND INSPECTIONS

A. If the Contract Documents, the DISTRICT Representative, or any instructions, laws, ordinances, or public authority require any part of the Work to be tested or approved, CONTRACTOR shall provide the DISTRICT Representative at least two (2) working days' notice of its readiness for observation or inspection. If inspection is by a public authority other than the DISTRICT, CONTRACTOR shall promptly inform the DISTRICT of the date fixed for such inspection. Required certificates of inspection (or similar) shall be secured by CONTRACTOR. Costs for DISTRICT testing and DISTRICT inspection shall be paid by the DISTRICT. Costs of tests for Work found not to be in compliance shall be paid by the CONTRACTOR.

B. If any Work is done or covered up without the required testing or approval, the CONTRACTOR shall uncover or deconstruct the Work, and the Work shall be redone after completion of the testing at the CONTRACTOR'S cost in compliance with the Contract Documents.

C. Where inspection and testing are to be conducted by an independent laboratory or agency, materials, or samples of materials to be inspected or tested shall be selected by such laboratory or agency, or by the DISTRICT, and not by CONTRACTOR. All tests or inspections of materials shall be made in accordance with the commonly recognized standards of national organizations.

D. In advance of the manufacturing of materials to be supplied by CONTRACTOR which must be tested or inspected, CONTRACTOR shall notify the DISTRICT so that the DISTRICT may arrange for testing at the source of supply. Any materials which have not satisfactorily passed such testing and inspection shall not be incorporated into the Work.

E. If the manufacturing of materials to be inspected or tested will occur in a plant or location outside the geographic limits of DISTRICT, the CONTRACTOR shall pay for any excessive or unusual costs associated with such testing or inspection, including but not limited to excessive travel time, standby time and required lodging.

F. Reexamination of the Work may be ordered by the DISTRICT. If so ordered, the Work must be uncovered or deconstructed by CONTRACTOR. If the Work is found to be in accordance with the Contract Documents, the DISTRICT shall pay the costs of reexamination and reconstruction. If such Work is found not to be in accordance with the Contract Documents, CONTRACTOR shall pay all costs.

Article 61. SOILS INVESTIGATION REPORT

Unless otherwise specifically provided, when a soils investigation report obtained from test holes at the site is available, such report shall not be a part of this Contract. Nevertheless, with respect to any such soils investigation and/or geotechnical report regarding the site, it shall be the responsibility of the CONTRACTOR to review and be familiar with such report. Any information obtained from such report, or any information given on drawings as to subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only, is not guaranteed, and does not form a part of the Contract, unless otherwise specifically provided. CONTRACTOR is required to make a visual examination of site and must make whatever tests he deems appropriate to determine the underground condition of the soil. Limited soil tests and subsurface investigations, if any, are available for review and consideration by CONTRACTOR and were conducted for the purpose of design only. Subsurface investigation information is made available by DISTRICT solely as a matter of convenience and general information for CONTRACTOR and CONTRACTOR is expected to review and be familiar with such information. No representation is made by the DISTRICT or its representatives that information provided is completely representative of all conditions and materials which may be encountered. If such a report is referenced in the Contract Documents for performance of the Work, such reference shall be to establish minimum requirements only. Further, no representation is made by the DISTRICT or its representatives that information provided is solely adequate for purposes of construction. DISTRICT disclaims responsibility for interpretations by CONTRACTOR of soil and subsurface investigation information, such as in protecting soil-bearing values, rock profiles, presence and scope of boulders and cobbles, soil stability and the presence, level, and extent of underground water. CONTRACTOR shall determine the means, methods, techniques, and sequences necessary to achieve required characteristics of completed Work. Conditions found after execution of the Agreement to be materially different from those reported and which are not customarily encountered in the geographic area of the Work shall be governed by provisions of the General Conditions of the Contract for unforeseen conditions.

Article 62. DISTRICT'S STATUS

A. The DISTRICT shall designate a representative during the construction period who shall observe the progress and quality of the Work on behalf of the DISTRICT. He or she shall have the authority to act on behalf of DISTRICT only to the extent expressly provided in the Contract Documents. The DISTRICT shall have authority to stop work whenever such stoppage may be necessary in its reasonable opinion to insure the proper execution of the Contract Documents.

B. CONTRACTOR further acknowledges that the DISTRICT shall be, in the first instance, the judge of the performance of this Contract.

Article 63. DISTRICT'S DECISIONS

CONTRACTOR shall promptly notify the DISTRICT in writing if the DISTRICT fails within a reasonable time, to make decisions on any claims of the DISTRICT or CONTRACTOR and on all other matters relating to the execution and progress of the Work.

Article 64. PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon application of either party, the Contract shall forthwith be physically amended to make such insertion or correction.

Article 65. LABOR/EMPLOYMENT SAFETY

The CONTRACTOR shall maintain emergency first aid treatment for his employees which complies with the Federal Occupational Safety and Health Act of 1970 (29 USC, Section 651 et seq.).

Article 66. ASSIGNMENT OF ANTITRUST ACTIONS

Pursuant to Public Contract Code Section 7103.5, in entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the CONTRACTOR or Subcontractor offers and agrees to assign to the DISTRICT all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 USC, Section 15) or under the Cartwright Act (chapter 2 (commencing with Section 16700) of part 2 of division 7 of the Business and Professions Code), arising from the purchase of goods, services, or materials pursuant to this Contract or any subcontract. This assignment shall be made and become effective at the time the DISTRICT tender's final payment to the CONTRACTOR, without further acknowledgment by the parties.

Article 67. SUBSTITUTION OF SECURITY

A. Upon the CONTRACTOR'S request, the DISTRICT will make payment of funds withheld from progress payments to ensure performance under the Contract pursuant to the requirements of Public Contract Code Section 22300 if the CONTRACTOR deposits in escrow with the DISTRICT or with a bank acceptable to the DISTRICT, securities eligible for investment under Government Code Section 16430, bank or savings and loan certificates of deposit, or other security mutually agreed to by the CONTRACTOR and the DISTRICT, subject to the following conditions:

1) The CONTRACTOR shall bear the expense of the DISTRICT and the escrow agent, either the DISTRICT or the bank, in connection with the escrow deposit made.

2) Securities or certificates of deposit to be placed in escrow shall be of a value at least equivalent to the amounts of retention to be paid to the CONTRACTOR pursuant to this Section.

3) The CONTRACTOR shall enter into an escrow agreement satisfactory to the DISTRICT, which agreement shall include provisions governing inter alia:

(a) The amount of securities to be deposited,

(b) The providing of powers of attorney or other documents necessary for the transfer of the securities to be deposited,

(c) Conversion to cash to provide funds to meet defaults by the CONTRACTOR, including, but not limited to, termination of the CONTRACTOR'S control over the work, stop payment notices filed pursuant to law, assessment of liquidated damages or other amounts to be kept or retained under the provisions of the contract,

(d) Decrease in value of securities on deposit,

(e) The termination of the escrow upon completion of the contract.

4) The CONTRACTOR shall obtain the written consent of the surety to such agreement.

5) As an alternative to CONTRACTOR depositing into escrow securities of a value equivalent to the amounts of retention to be paid to the CONTRACTOR, upon CONTRACTOR'S request, DISTRICT will make payment of retentions earned directly to the escrow agent at the expense of CONTRACTOR pursuant to and in accordance with Public Contract Code Section 22300.

Article 68. COMPLIANCE WITH STATE STORM WATER PERMIT FOR CONSTRUCTION

A. The CONTRACTOR shall be required to comply with all conditions of the State Water Resources Control Board (State Water Board) National Pollutant Discharge Elimination System General Permit for Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity (Permit) for all construction activity which results in the disturbance of in excess of one acre of total land area or which is part of a larger common area of development or sale. The DISTRICT shall be responsible for filing the Notice of Intent and for obtaining the Permit. The CONTRACTOR shall be solely responsible for implementing a Storm Water Pollution Prevention Plan (SWPPP) prior to initiating Work. It shall be CONTRACTOR'S responsibility to evaluate the cost of compliance with the SWPPP in bidding on this Contract. CONTRACTOR shall comply with all requirements of the State Water Resources Control Board. CONTRACTOR shall include all costs of compliance with specified requirements in the Contract amount.

B. CONTRACTOR shall be responsible for implementing and complying with the provisions of the Permit and the SWPPP, including the standard provisions, monitoring, and reporting requirements as required by the Permit. CONTRACTOR shall provide copies of all reports and monitoring information to the DISTRICT.

C. CONTRACTOR shall comply with the lawful requirements of any applicable municipality, the County, drainage DISTRICT, and other local agencies regarding discharges of storm water to separate storm drain system or other watercourses under their jurisdiction, including applicable requirements in municipal storm water management programs.

D. Failure to comply with the Permit is a violation of federal and state law. CONTRACTOR hereby agrees to indemnify and hold harmless the DISTRICT, its Board members, officers, agents, employees and authorized volunteers from and against any and all claims, demands, losses or liabilities of any kind or nature which DISTRICT, its Board members, officers, agents, employees and authorized volunteers may sustain or incur for noncompliance with the Permit arising out of or in connection with the Project, except for liability resulting from the negligence, or willful misconduct of the DISTRICT, its Board members, officers, agents, employees or authorized volunteers. DISTRICT may seek damages from CONTRACTOR for delay in completing the Contract in accordance with Article 6 hereof, caused by CONTRACTOR'S failure to comply with the Permit.

Article 69. CLAIMS RESOLUTION

A. **Exclusive Remedy**.

1) Compliance with the claim resolution process and timelines described in this Claims Resolution Section as well as the notice provisions of the Contract are express conditions precedent to CONTRACTOR'S right to commence litigation or arbitration, file a claim under the California Government Code, or commence any other legal action related to the Project ("Claims Resolution Process").

2) CONTRACTOR acknowledges that its failure, for any reason, to provide written notice and all required supporting documentation to permit the DISTRICT'S review and evaluation within the time frame required by this Claims Resolution Process, shall be deemed CONTRACTOR'S waiver, release, discharge and relinquishment of any right to assert, request, or demand any entitlement to an adjustment of the Contract Time or the contract Price on account of any instruction, request, drawings, specifications, action, condition, omission, default or other situation.

3) To the extent any provision(s) of this Claims Resolution Process conflict with or otherwise impair the timeframes and procedures of Public Contract Code Section 9204, the provisions of Section 9204 shall control. If provisions of this Claims Resolution Process are supplementary and/or in addition to the requirements of Section 9204, but do not conflict with or otherwise impair the timeframes and procedures of Section 9204, the provisions of this Claims Resolution Process and the Contract shall control.

B. **Performance during Claim Resolution Process**.

The CONTRACTOR shall diligently proceed with Work on the Project at the same time that Claims are addressed under the Claims Resolution Process. It is the intent of DISTRICT to resolve Claims with the CONTRACTOR as close to the events giving rise to the Claims as possible, and to avoid stale or late Claims and the late documenting of Claims. CONTRACTOR'S failure to diligently proceed in accordance with the DISTRICT'S instructions or the Contract terms will be considered a material breach of the Contract and a waiver of CONTRACTOR'S rights under this Contract.

C. **Waiver.**

If CONTRACTOR fails to timely submit any written notices required under the terms of the Contract or in this Claims Resolution Section, CONTRACTOR waives and releases its rights regarding further review of its Claim, unless CONTRACTOR and DISTRICT mutually agree in writing to other time limits.

D. **Intention.**

The Claims Resolution Process required herein is intended to provide a concise mechanism for resolving Claims as they arise during the Project, while requiring accurate documentation related to contested issues as to those Claims that are not contemporaneously resolved.

E. **Other Provisions.**

If portions of the Contract, other than this Claims Resolution Process, establish a specific process regarding a specific subject, then that process shall govern and control the resolutions of any disagreements thereunder. Otherwise, the provisions in this Claims Resolution Process shall control the resolution of all Claims.

F. **Claim Presentation**

1) **Claim**: A claim is a written demand by CONTRACTOR (or by CONTRACTOR on behalf of a Subcontractor) that the CONTRACTOR must submit by **registered mail or certified mail return receipt requested** for:

(a) An extension to the Contract Time, including relief from damages or penalties assessed by the DISTRICT for delay;

(b) Payment of money or damages arising from work done by, or on behalf of, the CONTRACTOR pursuant to the Contract and payment that is not otherwise expressly provided for in the Contract Documents or the CONTRACTOR is not otherwise entitled; or

(c) Payment that is disputed by the DISTRICT.

2) A PCO may be a Claim, but the Parties agree that a PCO shall only be a Claim if:

(a) The DISTRICT states in writing that it disagrees with the terms of a PCO and directs the CONTRACTOR to utilize the Claim Resolution Process, or

(b) The DISTRICT rejects in whole or in part a PCO and the CONTRACTOR states in writing that it is utilizing the Claim Resolution Process for the portion of the PCO that the DISTRICT rejected.

G. **Subcontractors.**

1) Public Contract Code Section 9204(d)(5) states that the CONTRACTOR may present to the DISTRICT a Claim on behalf of a Subcontractor or lower tier Subcontractor. A Subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier Subcontractor, that the CONTRACTOR present a claim for Work which was performed by the Subcontractor or by a lower tier Subcontractor on behalf of the Subcontractor. The Subcontractor requesting that the Claim be presented to the DISTRICT shall furnish reasonable documentation to support the Claim. Within 45 days of receipt of this written request, the CONTRACTOR shall notify the Subcontractor in writing as to whether the CONTRACTOR presented the claim to the DISTRICT and, if the CONTRACTOR did not present the Claim, provide the Subcontractor with a statement of the reasons for not having done so.

2) CONTRACTOR is responsible for providing this Claims Resolution Process to its Subcontractors and for ensuring that all Subcontractors or others who may assert Claims by and through Subcontractors and/or the CONTRACTOR are informed of this Claims Resolution Process. No Claim submitted by any party that fails to follow the provisions of this Claims Resolution Process will be considered. CONTRACTOR shall indemnify, keep, and hold harmless the DISTRICT and its consultants, against all suits, claims, damages, losses, and expenses, including but not limited to attorney's fees, caused by, arising out of, resulting from, or incidental to, the failure to provide this Claims Resolution Process to its Subcontractors or others who may assert Claims by and through Subcontractors and/or the CONTRACTOR.

3) **CONTRACTOR Must Timely Identify, Present, and Document Any Claim**

(a) Every Claim shall be stated with specificity in writing and signed by CONTRACTOR under penalty of perjury and presented to the DISTRICT within ten (10) calendar days from the date CONTRACTOR discovers or reasonably should discover, that an act, error or omission of DISTRICT, its agents or employees, or action, condition or other situation has occurred that may entitle CONTRACTOR to make a Claim. This shall include the CONTRACTOR'S actual or constructive knowledge of any instruction, request, drawings, specifications, action, condition, omission, default, or other situation for which the CONTRACTOR believes there should an adjustment of the Contract Price or Contract Time. CONTRACTOR shall provide this writing even if CONTRACTOR has not yet been damaged, delayed, or incurred extra cost when CONTRACTOR discovers, or reasonably should discover, the act, error, omission, action, condition, or situation giving rise to the incidents giving rise to the Claim. The writing shall:

i) Identify all of the issues, events, conditions, circumstances and/or causes giving rise to the Claim;

ii) Identify all pertinent dates and/or durations and all actual and/or anticipated effects on the Contract Price, milestones and/or Contract Time adjustments; and

iii) Identify in detail line-item costs if the Claim seeks money.

iv) If the Claim involves extra work, a detailed cost breakdown of the amounts the CONTRACTOR is seeking, including actual cost records (including without limitation, payroll records, material, and rental invoices and the like) demonstrating that those costs have actually been incurred. To the extent costs have not yet been incurred at the time the Claim is submitted, actual cost records must be submitted on a current basis not less than once a week during any period costs are incurred. A cost record will be considered current if submitted within seven (7) days of the date the cost reflected in the record is incurred. At the request of DISTRICT, extra costs may be subject to further verification procedures (such as having an inspector verify the performance of alleged extra work on a daily basis).

v) If the Claim involves an error or omission in the Contract Documents:

a. An affirmative representation under penalty of perjury by CONTRACTOR and any affected Subcontractors and suppliers that the error or omission was not discovered prior to submitting a proposal for the Work, and

b. A detailed statement demonstrating that the error or omission reasonably should not have been discovered, by CONTRACTOR, its Subcontractors, and suppliers, prior to submitting a proposal for the Work.

vi) If the Claim involves a request for additional compensation for escalation of materials costs, then this provision exclusively governs those request(s) by CONTRACTOR and the following are **all** conditions precedent to CONTRACTOR'S submission of a Change Order Request or Claim for additional compensation for escalation of materials costs.

a. CONTRACTOR shall not be entitled to submit a request for compensation for escalation of materials unless the actual cost of materials exceeds ten percent (10%) of the **total** material costs on the Project.

b. The cost escalation is the result of unusual and unforeseeable market conditions not reasonably foreseeable at the time of award of the Contract and was not an escalated cost resulting from any action or inaction of the CONTRACTOR.

c. CONTRACTOR timely ordered and/or purchased the materials at issue.

d. CONTRACTOR'S material costs were reasonable at the time of CONTRACTOR'S bid for the Project.

e. CONTRACTOR demonstrates an actual increase in the cost of materials in its Contract Price at the time of award of the Contract and/or as reflected in CONTRACTOR'S escrowed bid documents compared to CONTRACTOR'S actual material payment cost paid either at time of purchase or delivery, whichever is earlier.

f. An actual year-to-date price increase has occurred and can be substantiated by the E.N.R. 20-City Average Material Cost Index for the material at issue that demonstrates the claim for an increase in price of the material at the time of delivery of the higher priced material to the Project.

(b) The writing shall be accompanied by all documents substantiating CONTRACTOR'S position regarding the Claim.

(c) A Claim that asserts an effect on any schedule milestones and/or Contract Time shall include all pertinent scheduling data demonstrating the impact(s) on the critical path(s), milestone(s) and/or Contract Time.

(d) CONTRACTOR agrees that it shall not base its damages or its Claim on a "total cost" or "modified total cost" approach or calculation.

4) **Certification.** Each copy of the Claim Documentation shall be certified by a responsible officer of the CONTRACTOR in accordance with the requirements of the Contract Documents. This certification shall be under penalty of perjury and must include the following language immediately above or before the CONTRACTOR'S signature: "***I declare under penalty of perjury under the laws of the State of California that the information provided and statements made in this Claim are true and correct, substantiated and of merit***." The CONTRACTOR acknowledges that this requirement is not a mere formality but is

intended to ensure that the CONTRACTOR only submits Claims that it believes are true and correct, substantiated and have merit. Should CONTRACTOR fail to submit the foregoing written statement signed under penalty of perjury, CONTRACTOR waives and releases its Claim, including all rights and remedies in connection therewith. This certification must include a certification of any portion of the Claim from Subcontractor(s) or others who are asserting Claims by and through Subcontractors and/or the CONTRACTOR.

5) **DISTRICT'S Written Statement/Decision on Claim.** The DISTRICT shall issue a written statement/decision regarding the Claim to the CONTRACTOR within forty-five (45) days of receipt of the written Claim from the CONTRACTOR, or three (3) days after the DISTRICT'S first regular governing board meeting after that 45-day period if the DISTRICT'S governing board does not meet within that first 45-day period. If the DISTRICT fails to timely provide a written statement/decision regarding the Claim, the Claim shall be deemed rejected in its entirety.

6) **CONTRACTOR Must Demand an Informal Meet and Confer Conference if CONTRACTOR Pursues Any Claim**

(a) **FAILURE OF A CONTRACTOR TO TIMELY DEMAND A MEET AND CONFER CONFERENCE IS A WAIVER OF ITS RIGHT TO PURSUE ALL OR A PORTION OF ITS CLAIM.**

(b) **Where There Is No Agreement:** If there is no agreement between CONTRACTOR and the DISTRICT on a Claim, then within ten (10) calendar days of the date of the DISTRICT'S written statement/decision in response to a Claim or PCO, if CONTRACTOR pursues that Claim, then CONTRACTOR must demand, by **registered mail or certified mail return receipt requested,** a meet and confer conference with DISTRICT staff. A meet and confer conference with DISTRICT staff shall be a condition precedent to CONTRACTOR seeking any further relief, including a mediation as indicated below.

(c) **Where There Is Partial Agreement**: If CONTRACTOR and the DISTRICT partially agree on a Claim but do not reach complete agreement, then the Parties shall complete a Change Order, if applicable, for the issues and/or amounts agreed to. For those issues not agreed to, if CONTRACTOR pursues those issues from that Claim, then CONTRACTOR must demand, by **registered mail or certified mail return receipt requested,** a meet and confer conference with DISTRICT staff regarding those issues. A meet and confer conference with DISTRICT staff shall be a condition precedent to CONTRACTOR seeking any further relief, including a mediation as indicated below, in connection with the DISTRICT'S rejection.

(d) **Meet and Confer Conference.** DISTRICT and CONTRACTOR shall schedule the meet and confer conference as soon as reasonably possible after CONTRACTOR'S written demand for a meet and confer conference, but in no case later than thirty (30) days after CONTRACTOR'S demand.

(e) **DISTRICT'S Written Decision.** Within ten (10) **business** days of the meet and confer conference, the DISTRICT shall issue a written decision. If the DISTRICT fails to timely provide a written statement/decision after the meet and confer conference, all Claim issues that were part of the meet and confer conference shall be deemed rejected in their entirety.

i) If the DISTRICT'S decision completely resolves the Claim, then the Parties shall complete a Change Order, if applicable, for the issues and/or amounts agreed to.

ii) If the DISTRICT rejects the CONTRACTOR'S Claim in whole or in part or does not issue a timely written response, then the parties shall mediate the remaining issues of the Claim.

iii) CONTRACTOR'S costs incurred in seeking relief for Claims are not recoverable from DISTRICT.

7) **Mediation**

(a) At the DISTRICT'S sole discretion, this mediation may be a multiple-party mediation with the ARCHITECT, the CONSTRUCTION MANAGER, the Inspector, and/or other DISTRICT consultants.

(b) The DISTRICT and CONTRACTOR shall mutually agree to a mediator within ten (10) **business** days after the disputed portion of the Claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regards to the disputed portion of the Claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator.

8) **CONTRACTOR'S Obligation to File a Government Code Claim.** Nothing in this Contract, including this Claims Resolution Process, waives, modifies, or tolls the CONTRACTOR'S obligation to present a timely claim under Government Code Section 910, et seq. Therefore, in addition to complying with this Claims Resolution Process, the CONTRACTOR is required to present claims to the DISTRICT pursuant to Government Code Section 910, et seq. If after the requirements of this Claims Resolution Process are satisfied, and all or a portion of the Claim remains unresolved, and if the Government Code claim is rejected by the DISTRICT, the CONTRACTOR may proceed under the post-mediation provisions of this Claims Resolution Process.

9) **Post Mediation Provisions**

(a) **Claims of $375,000 or Less:** The provisions of Public Contract Code § 20104.4 shall apply. Pursuant to Public Contract Code § 20104.4(a), within sixty (60) days, but no earlier than thirty (30) days, following the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. Pursuant to Public Contract Code § 9204(d)(2)(D), a mediation conducted pursuant to this Claims Resolution Process shall excuse the obligation under Public Contract Code § 20104.4(a) to mediate after litigation has been commenced unless otherwise agreed to by the parties in writing.

(b) **Litigation of Claims in Excess of $375,000**. If, after a mediation as indicated above, the Parties have not resolved the Claim, either Party may commence an action in a court of competent jurisdiction to contest that decision within ninety (90) days following the conclusion of that mediation or one (1) year following the accrual of the cause of action, whichever is later. By mutual agreement, the Parties can agree to instead resolve the Claim through arbitration.

10) The DISTRICT shall be entitled to remedy any false claims, as defined in California Government Code Section 12650 *et seq*., made to the DISTRICT by the CONTRACTOR or any Subcontractor under the standards set forth in Government Code Section 12650 *et seq*. Any CONTRACTOR or Subcontractor who submits a false claim shall be liable to the DISTRICT for three times the amount of damages that the DISTRICT sustains because of the false claim. A CONTRACTOR or Subcontractor who submits a false claim shall also be liable to the DISTRICT for (a) the costs, including attorney fees, of a civil action brought to recover any of those penalties or damages, and (b) a civil penalty of up to $11,000 for each false claim. In addition, CONTRACTOR may be subject to criminal prosecution under California Penal Code §72 and/or civil liability under False Claims Act. If so, the DISTRICT may be entitled to recover its costs incurred to investigate any False Claim, including but not limited to attorneys' fees and expert fees incurred in connection with that investigation.

H. **Documentation of Resolution.**

If a Claim is resolved, the DISTRICT shall determine if that resolution shall be documented in an Agreement and Release of Any and All Claims form or other document, as appropriate.

I. **Claim Resolution Process – Non-Applicability**.

The procedures and provisions in this Claims Resolution Section shall **not** apply to:

1) DISTRICT'S determination of what Work is or will be constructed, or whether the Work complies with the Contract Documents for purposes of accepting the Work;

2) DISTRICT'S rights and obligations as a public entity, such as, but without limitation, the revocation of pre-qualified or qualified status, barring a CONTRACTOR from DISTRICT contracts, the imposition of penalties or forfeitures prescribed by statute or regulation; provided, however, that penalties imposed against a public entity by statutes such as Public Contract Code Section 7107, shall be subject to the mandatory dispute resolution provisions of this Claims Resolution Section and the Contract;

3) Personal injury, wrongful death or property damage claims;

4) Latent defect or breach of warranty or guarantee to repair;

5) Stop notices or stop payment notices; or

6) Any other DISTRICT rights as set forth herein.

J. The DISTRICT'S failure to respond to a Claim from the CONTRACTOR within the time periods described herein or to otherwise meet the time requirements of Public Contract Code Section 9204 shall automatically result in the Claim being deemed rejected in its entirety, with no admission by the DISTRICT as to the merits of the Claim.

K. If DISTRICT fails to timely issue payment for any Claim or portion of a Claim as required pursuant to these Claim Resolution Procedures, the CONTRACTOR is permitted to assess interest indicated in Public Contract Code Section 9204. Notwithstanding this provision, and in accordance with Public Contract Code Section 7107, the DISTRICT is entitled to withhold up to 150% of disputed amounts and the DISTRICT shall not be liable for payment of interest on such disputed amounts pending final adjudication of such disputes.

Article 70. GOVERNING LAW AND VENUE

This Contract shall be governed in accordance with the laws of the State of California and venue shall be in County where the Project is located.

Article 71. FINGERPRINTING

The determination of fingerprinting requirements are set forth in the Special Conditions.

A. Contracts for Construction, Reconstruction, Rehabilitation or Repair of a School Facility Involving More than Limited Contact with Students.

If the DISTRICT determines based on the totality of the circumstances concerning the Project that the CONTRACTOR and CONTRACTOR'S employees are subject to the requirements of Education Code Section 45125.2 pertaining to Contracts for Construction, Reconstruction, Rehabilitation or Repair of a School Facility because they will have contact other than limited contact with pupils, by execution of the Contract, the CONTRACTOR acknowledges that CONTRACTOR is entering into a contract for the construction, reconstruction, rehabilitation, or repair of a school facility where the CONTRACTOR and/or CONTRACTOR'S employees will have more than limited contact with students and the services to be provided do not constitute an emergency or exceptional situation. In accordance with Education Code Section 45125.2 the CONTRACTOR shall, at CONTRACTOR'S own expense, (a) install a physical barrier to limit contact with students by CONTRACTOR and/or CONTRACTOR'S employees, or (b) provide for the continuous supervision and monitoring of the CONTRACTOR and/or CONTRACTOR'S employees by an employee of the CONTRACTOR who has received fingerprint clearance from the California Department of Justice, or (c) provide for the surveillance of the CONTRACTOR and CONTRACTOR'S employees by a DISTRICT employee; and (d) CONTRACTOR and CONTRACTOR'S employees shall not use student restroom facilities;

B. Contracts for Construction, Reconstruction Rehabilitation or Repair of a School Facility Involving Only Limited Contact With Students.

If the DISTRICT determines based on the totality of the circumstances concerning the Project that the CONTRACTOR and CONTRACTOR'S employees are subject to the requirements of Education Code Section 45125.2 pertaining to Contracts for Construction, Reconstruction, Rehabilitation or Repair of a School Facility because they will have only limited contact with pupils, by execution of the Agreement/Contract, the CONTRACTOR acknowledges that CONTRACTOR is entering into a contract for the construction, reconstruction, rehabilitation or repair of a school facility involving only limited contact with students. Accordingly, the parties agree that the following conditions apply to any work performed by the CONTRACTOR and/or CONTRACTOR'S employees on a school site: (1) CONTRACTOR and/or CONTRACTOR'S employees shall check in with the school office each day immediately upon arriving at the school site; (2) CONTRACTOR and/or CONTRACTOR'S employees shall inform school office staff of their proposed activities and location at the school site; (3) Once at such location CONTRACTOR and/or CONTRACTOR'S employees shall not change locations without contacting the school office; (4) CONTRACTOR and CONTRACTOR'S employees shall not use student restroom facilities; and (5) If CONTRACTOR and/or CONTRACTOR'S employees find themselves alone with a student, CONTRACTOR and CONTRACTOR'S employees shall immediately contact the school office and request that a member of the school staff be assigned to the work location.

Article 72. COMPLIANCE WITH DTSC GUIDELINES – IMPORTED SOILS

If the project requires the use of imported soils, the CONTRACTOR shall be responsible to use and shall certify that the imported material it uses is free of any hazardous and/or toxic substance or material of any nature or type as defined in accordance with California Law and the California Health and Safety Code. The DISTRICT reserves the right to reject any imported material that has come from agricultural or commercial land uses. CONTRACTOR must notify the DISTRICT of the source of material and comply with the applicable Regional Water Quality Control Board Resolutions and when applicable, with the guidelines of the Department of Toxic Substances Control ("DTSC").

Article 73. NO ASBESTOS

A. The CONTRACTOR will be required to execute and submit a Certificate Regarding Non-Asbestos Containing Materials.

B. Should asbestos containing materials be installed by the CONTRACTOR in violation of this certification, or if removal of asbestos containing materials is part of the Project, decontaminations and removals will be performed in accordance with the requirements of all applicable laws and will meet the following criteria:

1) Decontamination and removal of work found to contain asbestos or work installed with asbestos containing equipment shall be done only under the supervision of a qualified consultant, knowledgeable in the field of asbestos abatement and accredited by the Environmental Protection Agency ("EPA").

2) The asbestos removal CONTRACTOR shall be an EPA accredited CONTRACTOR qualified in the removal of asbestos and shall be chosen and approved by the asbestos consultant who shall have sole discretion and final determination in this matter.

3) The asbestos consultant shall be chosen and approved by the DISTRICT which shall have sole discretion and final determination in this matter.

4) The work will not be accepted until asbestos contamination is reduced to levels deemed acceptable by the asbestos consultant.

C. If removal of asbestos containing materials is part of the Project, the cost of all asbestos removal, including, but not necessarily limited to the cost of the asbestos removal CONTRACTOR, the cost of the asbestos consultant, analytical and laboratory fees, time delays and additional costs that may be incurred by the DISTRICT shall be borne entirely by the CONTRACTOR.

D. Hold Harmless: Interface of work for the Project with work containing asbestos shall be executed by the CONTRACTOR at his/her risk and at his/her discretion with full knowledge of the currently accepted standards, hazards, risks, and liabilities associated with asbestos work and asbestos containing products. By execution of the Contract, the CONTRACTOR acknowledges the above and agrees to the fullest extent permitted by law to hold harmless the DISTRICT, its Governing Board, employees, agents, representatives, including its DISTRICT and assigns, for all asbestos liability which may be associated with this work. The CONTRACTOR further agrees to instruct his/her employees with respect to the above-mentioned standards, hazards, risk, and liabilities.

Article 74. LABOR COMPLIANCE MONITORING AND ENFORCEMENT

A. CONTRACTOR/Subcontractor Registration. A CONTRACTOR or Subcontractor shall not be qualified to bid on, be listed on a bid proposal (subject to the requirements of Public Contract Code Section 4104) or engage in the performance of any contract for public work unless currently registered and qualified to perform public work pursuant to Labor Code Section 1725.5, except under the limited circumstances set forth in Labor Code Section 1771.1(a). This requirement shall apply to any bid proposal submitted and any contract for public works. The DISTRICT may not accept a bid or enter into a contract for a public works project with an unregistered CONTRACTOR.

B. Compliance Monitoring and Enforcement. Pursuant to Labor Code Section 1771.4, this Contract is subject to compliance monitoring and enforcement by the Department of Industrial Relations. Each CONTRACTOR and Subcontractor performing work on the Project shall be required to comply with the provisions of the California Labor Code, beginning with Section 1720, and the regulations of the Department of Industrial Relations' Division of Labor Standards Enforcement (i.e., the Labor Commissioner), including, but not limited to, the standard provisions requiring payment of prevailing wages, maintenance and submission of certified payroll records, and the hiring of apprentices as appropriate. Unless otherwise specified, the CONTRACTOR shall be required to post job site notices regarding the requirements of this paragraph, as prescribed by regulation. CONTRACTOR and each Subcontractor shall be required to furnish the records specified in Labor Code Section 1776 directly to the Labor Commissioner at least monthly, or more frequently if specified in the Contract Documents, and in a format prescribed by the Labor Commissioner. This requirement shall apply to all projects, whether new or ongoing, on or after January 1, 2016.

C. CONTRACTOR shall be required to post a notice at the Project site in accordance with Title 8 of the California Code of Regulations, Section 16451, or as otherwise required by the Department of Industrial Relations.

Article 75. NOTIFICATION OF THIRD-PARTY CLAIMS

The DISTRICT shall provide the CONTRACTOR with timely notification of the receipt by the DISTRICT of any third-party claim relating to this Contract, and the DISTRICT may charge back to the CONTRACTOR the cost of any such notification.

Article 76. DRUGS, TOBACCO, ALCOHOL, ANIMALS

The CONTRACTOR shall prohibit and take all steps necessary to ensure that its and its Subcontractors' employees do not possess, consume, or work under the influence of any alcohol, tobacco, or illegal drugs while on the Project site. The CONTRACTOR shall take all necessary steps to ensure that its and its Subcontractor's employees comply with all applicable DISTRICT policies and directives relating to appearance and behavior on school sites and/or DISTRICT property. The CONTRACTOR shall prohibit and prevent its employees and Subcontractor's employees from bringing any animal onto the Project.

END OF GENERAL CONDITIONS DOCUMENT

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

BID: 2023-24.06R1

TEMPLE ACADEMY PERFORMING ARTS CENTER

SECTION 00 08 00
SPECIAL CONDITIONS

SPECIAL CONDITIONS

A. **Time of Performance**. The CONTRACTOR shall mobilize and commence work at the direction of DISTRICT staff. The CONTRACTOR shall complete the project within the period specified in the Special Conditions and in accordance with the schedule for the Project developed by the DISTRICT for the Project, if applicable. In entering into this Agreement, CONTRACTOR acknowledges and agrees that the construction duration stipulated herein is adequate and reasonable for the size and scope of the Project.

Work under this Contract shall be scheduled and coordinated in compliance with the following:

1. The anticipated date of the award of the Contract is **June 2024 - *Bidders shall understand and bid with the knowledge that this date is subject to change at the DISTRICT'S discretion.**

2. Bid submittals are due no later than **May 28, 2024, 2:00 pm.**

3. **Substitutions to Specified Materials, Processes, or Articles Prior to Bid Submittal**: Any proposals for substitutions of equipment, materials, or products other than what is specified in the bid documents must be submitted, in writing, **no later than May 13, 2024**. After reviewing the request, the DISTRICT will respond with its decision to all parties who have received a bid package. The DISTRICT has the right to reject any or all requests for substitutions of equipment, materials, or products other than what is specified in the bid documents. The Bidder shall bear all the DISTRICT'S costs associated with the review of substitution requests.

4. The Notice to Proceed will be issued by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT BOARD OF EDUCATION within sixty (60) calendar days from Notice of Contract Award.

5. CONTRACTOR shall complete work under this agreement as identified in the Scope of Work and Drawings and Specifications, or as arranged by the Director of Facilities.

6. The CONTRACTOR acknowledges that it fully understands the Project work to be performed has been scheduled by the DISTRICT for a specific time period. In addition, the CONTRACTOR acknowledges that it fully understands that scheduling has been established for this Project in order to promote the best usage of school facilities and to timely provide an appropriate learning environment for students to the fullest extent possible. With these understandings in mind, pursuant to Article 13 of the General Conditions regarding the DISTRICT'S Right to Terminate Contract, it is acknowledged and understood by the CONTRACTOR that it is a substantial violation of the Contract for the CONTRACTOR to fail to provide all submittals in the time specified and identified. Furthermore, it is acknowledged and understood by the CONTRACTOR that it is a substantial violation of the Contract for the CONTRACTOR to fail to provide a full work crew or properly skilled workers with proper and sufficient materials and equipment from the first day of Project work scheduled**,** or such Project work start date as shall be otherwise specified in writing by DISTRICT.

   If the site will not be available immediately after award of the Contract, CONTRACTOR shall utilize this time period for administrative tasks and initial mobilization and shall coordinate such activities with DISTRICT.

B. **Future Work.** All future work awarded from this bid shall be coordinated with the DISTRICT'S Project Manager and the CONTRACTOR. No work shall be started until scheduling has been agreed upon by all parties.

C. **Liquidated Damages - Contract Submittals**. If the executed Contract and required bonds and certificates of insurance are not received by the DISTRICT within ten (10) calendar days of Contract award, the agreed liquidated damages, due to the DISTRICT, established in Article 6 of the General Conditions is Five Hundred Dollars ($500.00) per day for each calendar date the start date is delayed.

Owner's Entitled Liquidated Damages - Time of Completion: If work under this Contract is not ready for the intended use within the specified time period, the agreed liquidated damages established in Article 6 of the General Conditions is Two Thousand Dollars ($2,000.00) per day for each calendar day completion is delayed.

CONTRACTOR'S Entitled Liquidated Damages - Time of Completion. If CONTRACTOR is entitled to compensation as a result of a Compensable Delay, then the agreed liquidated damages established in Article 6 of the General Conditions is One Thousand Five Hundred Dollars ($1,500.00) per day for each day of Compensable Delay.

D. **Documents Furnished.** The number of digital copies of Drawings and Specifications to be furnished to CONTRACTOR free of charge, per Article 3 of the General Conditions, is one (1). The cost for additional copies of the drawings shall be borne by the CONTRACTOR.

E. **Bonds.** CONTRACTOR shall provide (i) a bid bond or cashier's check payable to Hacienda La Puente Unified School DISTRICT in the amount not less than the total amount of the bid; (ii) a payment bond in the amount of one hundred percent (100%) of the total amount of the Contract Price or as specified in the Information for Bidders; and (iii) a performance bond in the amount of one hundred percent (100%) of the Contract Price or as specified in the Information for Bidders.

F. **Insurance.** As provided in General Conditions, CONTRACTOR shall procure and maintain and shall require all subcontractors, if any, whether primary or secondary, to procure and maintain either:

Comprehensive General Liability Insurance.

With a combined single limit per occurrence of not less than $2,000,000

OR

Commercial General Liability and Property Damage Insurance
(including automobile insurance) which provides limits of not less than:

(a)	Per occurrence (combined single limit)	$1,000,000
(b)	Project Specific Aggregate (for this project only)	$2,000,000
(c)	Products/Completed Operations	$1,000,000
(d)	Personal & Advertising Injury limit	$1,000,000

AND

Builder's Risk (or Course of Construction Coverage) Applicable/Fire Insurance

Project Replacement Value at 100% (One Hundred Percent) (see Article 23 of General Conditions).

Insurance Covering Special Hazards: The following special hazards shall be covered in addition to the above-mentioned commercial liability insurance or property damage insurance policy or policies of insurance, or by special policies of insurance, in amounts as follows:

Automotive and truck where operated in the amount of	$1,000,000
Material hoist where used in the amount of	$1,000,000
Explosion, collapse & Underground (XCU) coverage	$1,000,000
Excess Liability Insurance coverage in the amount of	$1,000,000

Additional Insurance. As provided in General Conditions, CONTRACTOR shall procure and maintain and shall require all subcontractors, if any, whether primary or secondary, to procure and maintain Worker's Compensation Insurance (Article 20 of General Conditions) and Automobile Liability Insurance (Article 22 of General Conditions).

Additional Insured Endorsement. Any general liability policy provided by CONTRACTOR hereunder shall contain an endorsement which applies its coverage to DISTRICT, members of DISTRICT'S Governing Board, and the officers, agents, employees, and volunteers of DISTRICT, the State Allocation Board if applicable, the CONSTRUCTION MANAGER, and the CONSTRUCTION MANAGER'S consultants, individually and collectively, as additional insureds (see General Conditions).

G. **Executed Copies.** The number of executed copies of the Agreement, the Performance Bond, and the Payment Bond for Public Works required is two (2).

H. **License Classification.** Each bidder shall be a licensed CONTRACTOR pursuant to the Business and Professions Code and shall be licensed in the following classification(s), including but not restricted to: **A or B; or a combination of Specialty Licenses adequate for the work**.

I. **Fingerprinting.** Pursuant to the provisions of Article 72 of the General Conditions, the DISTRICT Determination of Fingerprinting Requirement Application is as follows:

a. The DISTRICT has considered the totality of the circumstances concerning the Project and has determined that the CONTRACTOR and CONTRACTOR'S employees:

1. _____ are subject to the requirements of Education Code section 45125.2 and Paragraph (a) of Article 72 of the General Conditions. Fingerprinting and criminal background checks are required for this project.

2. __X__ are not subject to the requirements of Education Code section 45125.2 and are subject to Paragraph (b) of Article 72 of the General Conditions.

J. **Cleaning Up.** Pursuant to the specific provisions of Article 55 "Cleaning Up" of the General Conditions, the CONTRACTOR is responsible at all times to keep the premises free from debris, waste, rubbish and excess materials and dispose of it in disposal site in accordance with provisions of existing law. The CONTRACTOR acknowledges and understands that the Project work hereunder is to be performed on existing and functioning school facilities. The CONTRACTOR hereby acknowledges and agrees that if and/or when the CONTRACTOR fails to fulfill its clean-up responsibility on a daily basis, the DISTRICT will undertake to authorize additional regular work or overtime work by its own maintenance and/or custodial employees to keep the premises free from debris, waste and rubbish by authorizing regular and/or overtime work for its maintenance and/or custodial employees. This work time shall be charged back to the CONTRACTOR and deducted from the CONTRACTOR'S progress payments and/or final payment at the rate of **$22.00 per hour for regular time and $33.00 per hour for overtime**. The CONTRACTOR will not be notified in advance of any such cleanup of the premises to be performed by the DISTRICT'S employees unless the number of hours required in any work week for such cleanup of the premises by DISTRICT employees is both anticipated and estimated by the DISTRICT to exceed five (5) total weekly hours of either the regular or overtime rates specified herein, or the combined regular and overtime rates specified herein.

K. **Inspector's Field Office**. **Not Applicable**.

L. **Time of Work Restrictions.** The worksites will be available Monday through Friday, from 6:30:00 AM to 4:30:00 PM. This schedule is subject to change as the needs of the DISTRICT require and would be scheduled with the Director of Purchasing or his designee.

M. **Continuity of Work Agreement. This project is subject to the Continuity of Work Agreement between HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and the Los Angeles/Orange Counties Building and Construction Trades Council, Signatory Craft Councils, and Unions. Bidders are required to provide a signed letter of assent on bidders letterhead with the sealed bid. Letters of Assent from all named subcontractors must be submitted within five (5) days of the opening of the bids and prior to the award of bid, DISTRICT reserves the right to give extension for the subcontractor letters. Failure to submit Letters of Assent as required by this section will deem the bid non-responsive.**

N. **Project Phases. Not Applicable**.

O. **Safety Barriers and Fencing.** Work on this project will occur on a school site partially occupied and in close proximity to the public. The CONTRACTOR will provide 6 foot high chain link temporary fencing with fabric windscreen adjacent to walkways and the perimeter of the school. At all times shall the construction area be secure and safe from site staff and members of the public.

SCOPE OF WORK

The HACIENDA LA PUENTE UNIFIED DISTRICT is seeking bids for the construction of a new Performing Arts Center at Temple Academy. Please refer to the Drawings, Geotechnical Reports & Specifications for further details.

PROJECT SCHEDULE

A. Anticipated Start Date: **The Notice to Proceed will be issued by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT BOARD OF EDUCATION within sixty (60) calendar days from Notice of Contract Award. *Bidders shall understand and bid with the knowledge that this date is subject to change at the DISTRICT'S discretion.**

B. Completion Date: **CONTRACTOR shall have 420 consecutive calendar days from the Notice to Proceed to complete the work.**

C. The CONTRACTOR shall be aware that the San Gabriel Valley Aquatic Center project is concurrently ongoing on the west property line of the Performing Arts Center Project. Prior to commencement of work, the CONTRACTOR is required to familiarize themselves with the status and schedule of the adjacent project. Any lack of awareness of the ongoing neighboring project will not be accepted as a valid excuse for delays or coordination issues. The CONTRACTOR is expected to plan and execute their work with due consideration for the simultaneous activities on the West property line.

D. It is the CONTRACTOR'S responsibility to proactively manage and sequence their work to prevent delays caused by interactions with the San Gabriel Valley Aquatic Center project. Any delays resulting from inadequate coordination or sequencing shall be the sole responsibility of the CONTRACTOR, and they shall not be entitled to claim additional time or compensation due to such delays.

END OF SPECIAL CONDITIONS DOCUMENT

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

BID: 2023-24.06R1

TEMPLE ACADEMY PERFORMING ARTS CENTER

SECTION 00 09 00
CERTIFICATIONS

WORKERS' COMPENSATION CERTIFICATION

Labor Code Section 3700 in relevant part provides:

> Every employer except the State shall secure the payment of compensation in one or more of the following ways:
>
> (a) By being insured against liability to pay compensation in one or more insurers duly authorized to write compensation insurance in this State.
>
> (b) By securing from the Director of Industrial Relations a certificate of consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his employees.

I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

_____
Name

_____
Title

_____
Company

(In accordance with Article 5 (commencing at Section 1860), Chapter 1, Part 7, Division 2 of the Labor Code, the above certificate must be signed and filed with the awarding body prior to performing any work under this contract.)

DRUG-FREE WORKPLACE CERTIFICATION

This Drug-Free Workplace Certification form is part of the Contract made by and between the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT (hereinafter referred to as the "DISTRICT") and _____ (hereinafter referred to as the ("CONTRACTOR"), for the Project (hereinafter referred to as the "Project." **TEMPLE ACADEMY PERFORMING ARTS CENTER, Bid No. 2023-24.06R1**. This form is required from all successful Bidders pursuant to the Drug-Free Workplace Act of 1990 (Government Code Section 8350 et seq.) The Drug-Free Workplace Act requires that every person or organization awarded a contract or grant for procurement of any property or service from any State agency must certify that it will provide a drug-free workplace by doing certain specified acts. In addition, the Act provides that each contract or grant awarded by a State agency may be subject to suspension of payments or termination, and the CONTRACTOR or grantee may be subject to debarment from future contracting, if the contracting agency determines that specified acts have occurred. The DISTRICT is not a "state agency" as defined in the applicable Section(s) of the Government Code, but the DISTRICT is a local agency under California law and requires all CONTRACTORS on public works projects to comply with the provisions and requirements of the Drug-Free Workplace Act.

Pursuant to Government Code Section 8355, every person or organization awarded a contract or grant from a State agency shall certify that it will provide a drug-free workplace by doing all of the following:

A. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in their workplace and specifying actions which will be taken against employees for violations of the prohibition;

B. Establishing a drug-free awareness program to inform employees about all of the following:

1. The dangers of drug abuse in the workplace;
2. The person's or organization's policy of maintaining a drug-free workplace;
3. The availability of drug counseling, rehabilitation, and employee-assistance programs; and
4. The penalties that may be imposed upon employees for drug abuse violations.

C. Requiring that each employee engaged in the performance of the contract or grant be given a copy of the statement required by subdivision A, and that, as a condition of employment on the contract or grant, the employee agrees to abide by the terms of the statement.

I, the undersigned, agree to fulfill the terms and requirements of the Drug-Free Workplace Act as it now exists or may hereinafter be amended. Particularly, I shall abide by Government Code Section 8355 when performing the Contract for the Project by:

A. Publishing a statement notifying employees concerning the prohibition of controlled substance at my workplace;

B. Establishing a drug-free awareness program; and

C. Requiring that each employee engaged in the performance of the contract be given a copy of the statement required by Section 8355(a) and agree to abide by the terms of that statement.

I also understand that if the DISTRICT determines that I have either: (a) made a false certification herein; or (b) violated this certification by failing to carry out the requirements of Section 8355, the Contract awarded herein is subject to termination, suspension of payments, or both. I further understand that if I violate the terms of the Drug-Free Workplace Act, I may be subject to debarment.

I acknowledge that I am aware of the provisions of Government Code Section 8350 et seq., and hereby certify that I will adhere to the requirements of the Drug-Free Workplace Act.

Executed on this ____ day of _____ 20___ at _____

_____
Name of CONTRACTOR (Print or Type)

By: _____
Signature

_____
Typed or Printed Name

_____
Title

CONTRACTOR FINGERPRINTING CERTIFICATION

The undersigned does hereby certify to the governing board of the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT ("DISTRICT") as follows:

That I am a representative of the CONTRACTOR currently under contract ("Contract") with the DISTRICT; that I am familiar with the facts herein certified and am authorized and qualified to execute this certificate on behalf of CONTRACTOR.

CONTRACTOR certifies that it has taken at least one of the following actions with respect to the construction project that is the subject of the Contract (check all that apply):

_____ The CONTRACTOR has complied with the fingerprinting requirements of Education Code Section 45125.1 with respect to all CONTRACTOR'S employees and all of its subcontractors' employees who may have contact with _____ pupils in the course of providing services pursuant to the Contract, and the California Department of Justice has determined that none of those employees has been convicted of a felony, as that term is defined in Education Code Section 45122.1. A complete and accurate list of CONTRACTOR'S employees and of all of its subcontractors' employees who may come in contact with DISTRICT pupils during the course and scope of the Contract is attached hereto; and/or

_____ Pursuant to Education Code Section 45125.2, CONTRACTOR has installed or will install, prior to commencement of Work, a physical barrier at the Work Site, that will limit contact between CONTRACTOR'S employees and DISTRICT pupils at all times; and/or

_____ Pursuant to Education Code Section 45125.2, CONTRACTOR certifies that all employees will be under the continual supervision of, and monitored by, an employee of the CONTRACTOR who the California Department of Justice has ascertained has not been convicted of a violent or serious felony. The name and title of the employee who will be supervising CONTRACTOR'S employees and its subcontractors' employees is:

Name: _____

Title: _____

__X__ The Work on the Contract is at an unoccupied site and no employee and/or subcontractor or supplier of any tier of Contract shall come in contact with DISTRICT pupils.

CONTRACTOR'S responsibility for background clearance extends to all of its employees, Subcontractors, and employees of Subcontractors coming into contact with DISTRICT pupils regardless of whether they are designated as employees or acting as independent CONTRACTORS of the CONTRACTOR.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Typed or Printed Name: _____

Title: _____

BIDDER'S ACKNOWLEDGEMENT OF PROJECT SCHEDULE

TEMPLE ACADEMY CENTER PERFORMING ARTS CENTER
BID NO. 2023-24.06R1

The undersigned acknowledges that he/she has carefully and thoroughly reviewed the Project Schedule, included herein and made a part of the Contract Documents.

The undersigned fully understands the manpower requirements necessary to complete the project in accordance with the Project Schedule and agrees to furnish all labor, materials, and equipment necessary, upon DISTRICT acceptance of Bidder's proposal, to fully comply with this schedule. The undersigned agrees to comply with any and all adjustments to the schedule, as may be directed by the DISTRICT or its representative, and which may be required to ensure project completion as stipulated in the Contract Documents.

The undersigned acknowledges that failure to comply with the above could result in delays to other CONTRACTORS, whose bona fide and substantiated cost impacts due to said delays may be borne by the undersigned.

ACKNOWLEDGED AND AGREED:

DATE: _____

_____
CONTRACTOR

By: _____
Signature

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION

I am aware of and hereby certify that neither _____ nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. I further agree that I will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the Bidder/offeror/CONTRACTOR or any lower participant is unable to certify this statement, it shall attach an explanation to this solicitation proposal.

IN WITNESS WHEREOF, this instrument has been duly executed by the Principal of the above-named Bidder on the ____ day of _____, 20___ for the purposes of submission of this bid.

(Corporate Seal)

By: _____
Signature

_____
Typed or Printed Name

_____
Title

_____
Date

As the awardee under this Bid, I hereby certify that the above certification remains valid as of the date of contract award, specifically, as of the ___ day of _____, 20___, for the purposes of award of this contract.

(Corporate Seal)

By: _____
Signature

_____
Typed or Printed Name

_____
Title

_____
Date

00125-00005/1461351.1

LETTER OF ASSENT

[TO BE SIGNED BY ALL CONTRACTORS AND SUBCONTRACTORS AWARDED WORK COVERED BY THE CONTINUITY OF WORK AGREEMENT PRIOR TO COMMENCING WORK ON ANY PROJECT]

[CONTRACTOR'S LETTERHEAD]

Project Labor Coordinator
c/o Hacienda La Puente Unified School District
15959 East Gale Avenue
City of Industry, California 91745
Attn: Joel Duarte

Re: Letter of Assent – Continuity of Work Agreement

Dear Sir:

This is to confirm that _____ ("Company") agrees to be party to and bound by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Continuity of Work Agreement effective April 1, 2019, as such Agreement may, from time to time, be amended by the negotiating parties or interpreted pursuant to its terms. Such obligation to be a party and bound by this Agreement shall extend to all work covered by the agreement undertaken by this Company on the project and this Company shall require all of its CONTRACTORS and subcontractors of whatever tier to be similarly bound for all work within the scope of the Agreement by signing and furnishing to you an identical letter of assent prior to their commencement of work.

Sincerely

[Name of Construction Company]

By: [_____] Name and Title of Authorized Executive

[Copies of this letter must be submitted to the DISTRICT Coordinator and to the Council Consistent with Article II. Section 2.5(b).]

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

BID: 2023-24.06R1

TEMPLE ACADEMY PERFORMING ARTS CENTER

SECTION 00 10 00
CONTINUITY OF WORK/
PLA AGREEMENT

RON MILLER
Executive Secretary

Los Angeles / Orange Counties Building and Construction Trades Council

Affiliated with the Building & Construction Trades Dept., AFL-CIO

1626 Beverly Boulevard
Los Angeles, CA 90026-5784
Phone (213) 483-4222
(714) 827-6791
Fax (213) 483-4419

March 19, 2014

Via Certified Mail

Mark L. Hansberger
Director of Facilities, M&O
Hacienda/La Puente Unified School District
15959 East Gale Avenue
City of Industry, CA 91716-0002

RE: Hacienda La Puente Unified School District
Continuity of Work Agreement

Dear Mr. Hansberger:

Enclosed please find three (3) original Continuity of Work Agreements by and among Hacienda La Puente Unified School District and the Los Angeles/Orange Counties Building & Construction Trades Council and the Signatory Craft Councils and Unions, ready to be executed by Cynthia Paulan-Colfer, Superintendent of Hacienda La Puente USD.

Upon obtaining signature(s) for the three (3) originals, by the Superintendent, please return two (2) fully-executed **originals** to the Council; and one (1) is to be kept by Hacienda La Puente USD. for your files.

If you should have any questions, please contact me at the Council office.

Sincerely,

Ron Miller
Executive Secretary

Enclosures (3)

RM:aht
opeiu#537 afl-cio

CONTINUITY OF WORK AGREEMENT

BY AND AMONG

THE HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

AND

LOS ANGELES AND ORANGE COUNTIES
BUILDING AND CONSTRUCTION TRADES COUNCIL

AND

THE SIGNATORY CRAFT COUNCILS AND UNIONS

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HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT
CONTINUITY OF WORK AGREEMENT

This Continuity of Work Agreement (hereinafter, "Agreement") is entered into this _____ day of _____, 2013 by and among the Board of Education of the Hacienda La Puente Unified School District (the "District"), the Los Angeles/Orange Counties Building and Construction Trades Council (the "Council"), and the signatory Craft Councils and Unions signing this Agreement (hereinafter together with the Council, collectively, the "Union" or "Unions"). This Agreement establishes the labor relations guidelines and procedures for the District and for the Contractors and craft employees represented by the Unions and engaged in Project Work. The District, Council and Unions are hereinafter referred to herein, as the context may require, as "Party" or "Parties."

It is understood by the Parties to this Agreement that if this Agreement is acceptable to the District, it will become the policy of the District for the Project Work to be contracted exclusively to Contractors who agree to execute and be bound by the terms of this Agreement, directly or through the Letter of Assent (a form of which is attached as "***Attachment A***"), and to require each of its subcontractors, of whatever tier, to become bound. The District shall include, directly or by incorporation by reference, the requirements of this Agreement in the advertisement of and/or specifications for each and every contract for Project Work to be awarded by the District.

It is further understood that the District shall actively administer and enforce the obligations of this Agreement to ensure that the benefits envisioned from it flow to all signatory Parties, the Contractors and crafts persons working under it, and the residents and students of the District. The District shall therefore designate a "Project Labor Coordinator," either from its own staff or an independent contractor acting on behalf of the District, to monitor compliance with this Agreement; assist, as the authorized representative of the District, in developing and implementing the programs referenced herein, all of which are critical to fulfilling the intent and purposes of the Parties and this Agreement; and to otherwise implement and administer this Agreement. For such purposes, each Contractor recognizes and appoints the Project Labor Coordinator, its successors or assigns, as its agent; and together with District and the Unions, the Project Labor Coordinator shall be considered a "negotiating party" of this Agreement.

The Union and all Contractors agree to abide by the terms and conditions of this Agreement and agree that this Agreement represents the complete understanding of the Parties. No Contractor is or will be required to sign or otherwise become a party to any other collective bargaining agreement with a signatory Union as a condition of performing work within the scope of this Agreement.

The Parties agree that this Agreement will be made available to, and will fully apply to, any successful bidder for Project Work, without regard to whether that successful bidder performs work at other District sites on either a union or non-union basis. This Agreement shall not apply to any work of any Contractor other than that on Project Work specifically covered by this Agreement.

The use of masculine or feminine gender or titles in this Agreement should be construed as including both genders and not as gender limitations unless the Agreement clearly requires a different construction. Further, the use of Article titles and/or Section headings are for information only, and carry no legal significance.

ARTICLE 1
INTENT AND PURPOSE; DEFINITIONS

Section 1.1 Background. The goal of the Board of Education is to continue to improve and rehabilitate the District's facilities so as to provide sufficient facilities and technologies to properly educate the children within the District's boundaries. The District's repair, upgrade, renovation, rehabilitation, improvement work and new construction projects described on ***Attachment B*** to this Agreement in furtherance of the District's goals and policies with respect to its facilities. The District, therefore, wishing to utilize the most modern, efficient and effective procedures for construction, including assurances of a sufficient supply of skilled craft persons, and the elimination of disruptions or interference with Project Work, adopts this Agreement in the best interests of the students, parents, District staff, and the taxpayers of the District to meet the District's goal that the Project Work be completed on time and within budget.

Section 1.2 Definitions. The following terms shall have the following meanings when used herein:

1.2.1 "Apprentice" means those employees registered and participating in Joint Labor/Management Apprenticeship Programs approved by the Division of Apprenticeship Standards, Department of Industrial Relations of the State of California.

1.2.2 "Contractor" means any individual, firm, partnership, or corporation, or combination thereof, including joint ventures, which as an independent Contractor has entered into a contract with the District with respect to the Project Work, or a subcontractor of whatever tier utilized by a Contractor for Project Work.

1.2.3 "District" means the Hacienda La Puente Unified School District.

1.2.4 "Joint Labor/Management Apprenticeship Program" means a joint Union and Contractor administered apprenticeship program certified by the Division of Apprenticeship Standards, Department of Industrial Relations of the State of California.

1.2.5 "Letter of Assent" means the document, in the form attached hereto as ***Attachment A***, that each Contractor (of any tier) must sign and submit to the Project Labor Coordinator and the Council, before beginning any Project Work, which formally binds them to adherence to all the forms, requirements and conditions of this Agreement.

1.2.6 "Project" or "Projects" or "Project Work" means the District's repair, renovation, rehabilitation, upgrade and improvement projects listed and described on ***Attachment B*** to this Agreement, as may be hereafter amended by the District.

1.2.7 "Schedule A Agreement" means the local collective bargaining agreements of the signatory Unions having jurisdiction over the Project Work and which have signed this

Agreement, as such Schedule A Agreement(s) may be changed from time-to-time and which are incorporated herein by reference.

1.2.8 "Subscription Agreement" means the contract between a Contractor and a Union's Labor/Management Trust Fund(s) that allows the Contractor to make the appropriate fringe benefit contributions in accordance with the terms of Schedule A Agreement.

Section 1.1 Identification and Retention of Skilled Labor and Employment of District Resident. The work on the Projects is anticipated to require large numbers of craft personnel and other supporting workers. It is therefore the explicit understanding and intention of the Parties to this Agreement to use the opportunities provided by the extensive amount of work to be covered by this Agreement to identify and promote, through cooperative efforts, programs and procedures (which may include, for example, programs to prepare persons for entrance into formal apprenticeship programs, or outreach programs to the community describing opportunities available as a result of the Project Work), the interest and involvement of District residents in the construction industry; assist them in entering the construction trades, and through utilization of the joint labor/management sponsored apprenticeship programs, provide training opportunities for those District residents and other individuals wishing to pursue a career in construction. Further, with assistance of the Project Labor Coordinator, the District, the Contractors, the Unions and their affiliated regional and national organizations, will work jointly to promptly develop and implement procedures for the identification of craft needs, the scheduling of work to facilitate the utilization of available craft workers, and the securing of services of craft workers in sufficient numbers to meet the high demands of the Project Work to be undertaken.

Section 1.2 Encouragement of Small Local Business. The Project Work will provide many opportunities for local small business enterprises to participate as Contractors or suppliers, and the Parties therefore agree that they will cooperate with all efforts of the District, the Project Labor Coordinator, and other organizations retained by the District for the purpose, to encourage and assist the participation of local small businesses in Project Work. Each Party agrees that it shall employ demonstrable efforts to encourage utilization in an effort to achieve such goals. This may include, for example, participation in outreach programs, education and assistance to businesses not familiar with working on a project of this scope, and the encouragement of local residents to participate in Project Work through programs and procedures jointly developed to prepare and encourage such local residents for apprenticeship programs and formal employment on the Project Work through the referral programs sponsored and/or supported by the Parties to this Agreement. Further, the Parties shall ensure that the provisions of this Agreement do not inadvertently establish impediments to participation of such small local businesses and residents of the District.

Section 1.3 Project Cooperation. The Parties recognize that the construction to take place under this Agreement involves unique and special circumstances which dictate the need for the Parties to develop specific procedures to promote high quality, rapid and uninterrupted construction methods and practices. The smooth operation and successful and timely completion of the Project Work is vitally important to the parents and the students of the District. The Parties therefore agree that maximum cooperation among all Parties involved is required; and that with construction work of this magnitude, with multiple Contractors and crafts performing work on multiple sites of over an extended period of time, it is essential that all Parties work in a spirit of

harmony and cooperation, and with an overriding commitment to maintain the continuity of Project Work. Further, the Parties recognize that an Act of God or on Act of War could require the District to partially or fully suspend Project Work. The Parties shall fully cooperate with any request by the District to redirect their equipment, skills and expertise to support the District's efforts necessitated by such events.

Section 1.4 Workers' Compensation Carve-out. Further, the Parties recognize the potential which the Project Work may provide for the implementation of a cost effective workers' compensation system, as permitted by revised California Labor Code Section 3201.5, and it is understood that the District is in an ongoing review of the value of such a program. Should the District request, the Union parties agree to meet and negotiate in good faith with representatives of the District for the development, and subsequent implementation, of an effective program involving improved and revised dispute resolution and medical care procedures for the delivery of workers' compensation benefits and medical coverage as permitted by the California Labor Code.

Section 1.5 Peaceful Resolution of Disputes. In recognition of the special needs of the Project Work and to maintain a spirit of harmony, labor-management peace and stability during the term of this Continuity of Work Agreement, the Parties agree to establish effective and binding methods for the settlement of all misunderstandings, disputes and grievances; and in recognition of such methods and procedures, the Unions agree not to engage in any strike, slowdowns or interruptions or disruption of Project Work, and the Contractors agree not to engage in any lockout.

Section 1.6 Binding Agreement of the Parties and Inclusion of District Residents and Businesses. By executing this Agreement, the District, Council, Unions and Contractors agree to be bound by each and all of the provisions of this Agreement, and pledge that they will work together to adopt, develop and implement processes and procedures which are inclusive of the residents and businesses of the District.

ARTICLE 2
SCOPE OF THE AGREEMENT

Section 2.1 General. This Agreement shall apply and is limited to all of the District's Project Work, as specified in Section 2.2 of this Article, performed by those Contractor(s) of whatever tier that have contracts awarded for such work, for the development of the District's facilities which, jointly, constitute the Project, and have been designated by the District for construction or rehabilitation.

Section 2.2 Specific. The work covered by this Agreement is defined as and limited to the work, authorized during the Term hereof, on Projects listed on ***Attachment B*** hereto, as may be hereafter amended by the District.

It is understood by the Parties that the District may at any time, and at its sole discretion, determine to build portions of the Projects under this Agreement which were not currently proposed, or to modify or not to build any one or more particular portions proposed to be covered.

Section 2.3 Bundling of Contracts. The Parties agree that, to the maximum extent feasible, and consistent with goals of the District to (i) utilize this Agreement as the labor relations Policy for the Projects, and (ii) fully utilize the services of local small business enterprises for work on the Projects:

(a) The District, in its sole discretion, with the advice of the Project Labor Coordinator, will seek to group (or "bundle") for bidding, contracts not meeting the thresholds of Section 2.2 (a) above. This provision applies to small contracts for like types of work, scheduled to be undertaken at the same school or project site, and within the same timeframe, will be considered for such bundling, consistent with economies of scale, and the purposes of this Agreement: and

(b) Project Work will not be split, divided or otherwise separated for contract award purposes to avoid application of this Agreement.

Section 2.4 Exclusions. Items specifically excluded from the Scope of this Agreement include the following:

(a) Work of non-manual employees, including but not limited to: superintendents; teachers; supervisors; staff engineers; time keepers, mail carriers, clerks, office workers, messengers; guards, safety personnel, emergency medical and first aid technicians; and other professional, engineering, administrative, supervisory and management employees;

(b) Equipment and machinery owned or controlled and operated by the District;

(c) All off-site manufacture and handling of materials, equipment or machinery; provided, however, that lay down or storage areas for equipment or material and manufacturing (prefabrication) sites, dedicated solely to the Project or Project Work, and the movement of materials or goods between locations on a Project site are within the scope of this Agreement;

(d) All employees of the District, Project Labor Coordinator, design teams (including, but not limited to architects engineers and master planners), or any other consultants for the District (including, but not limited to, project managers and construction managers and their employees were not engaged in Project Work) and their sub-consultants, and other employees of professional service organizations, not performing manual labor within the scope of this Agreement; provided, however, that it is understood and agreed that Building/Construction Inspector and Field Soils and Materials Testers (Inspectors) are a covered craft under the PLA. (This inclusion applies to the scope of work defined in the State of California Wage Determination for said Craft. This shall also specifically include such work where it is referred to by utilization of such terms as "quality control" or "quality assurance." Every Inspector performing under the Wage classification of Building/Construction Inspector and Field Soils and Material Testers under a professional services agreement of a construction contract shall be bound to all applicable requirements of the PLA.) Covered Work as defined by this Agreement shall be performed pursuant to the terms and conditions of this Agreement regardless of the manner in which the work was awarded;

(e) Any work undertaken by state, county, city or other governmental bodies, or their contractors; or by public utilities, or their contractors; and/or by the District or its contractors (for work for which is not within the scope of this Agreement);

(f) Off-site maintenance of leased equipment and on-site supervision of such work;

(g) Work by employees of a manufacturer or vendor necessary to maintain such manufacturer's or vendor's warranties or guaranty. It is recognized that certain materials, equipment and systems of a highly technical and specialized nature will have to be installed at the Project. The nature of the materials, equipment and systems, together with requirements of manufacturer's or vendor's warranty, may dictate that it be prefabricated, pre-piped, and/or pre-wired and that it be installed under the supervision and direction of Owner's and/or manufacturer's personnel. The Unions agree to install such material, equipment and systems without incident;

(h) Non-construction support services contracted by the District, Project Labor Coordinator, or Contractor in connection with this Project; and

(i) Laboratory work for testing.

Section 2.5 Awarding of Contracts.

(a) The District and/or the Contractors, as appropriate, have the absolute right to award contracts or subcontracts on this Project to any Contractor notwithstanding the existence or non-existence of any agreements between such Contractor and any Union parties, provided only that such Contractor is willing, ready and able to execute and comply with this Continuity of Work Agreement should such Contractor be awarded work covered by this Agreement.

(b) It is agreed that all Contractors and subcontractors of whatever tier, who have been awarded contracts for work covered by this Agreement, shall be required to accept and be bound to the terms and conditions of this Agreement, and shall evidence their acceptance by the execution of the Letter of Assent as set forth in ***Attachment A*** hereto, prior to the commencement of any Project Work. At the time that any Contractor enters into a subcontract with any subcontractor of any tier providing for the performance on the construction contract, the Contractor shall provide a copy of this Agreement to said subcontractor and shall require the subcontractor, as a part of accepting the award of a construction subcontract, to agree in writing in the form of a Letter of Assent to be bound by each and every provision of this Agreement prior to the commencement of work on the Project. No Contractor or subcontractor shall commence Project Work without having first provided a copy of the Letter of Assent as executed by it to the Project Labor Coordinator and to the Council forty-eight (48) hours before the commencement of Project Work, or within forty-eight (48) hours after the award of Project Work to that Contractor (or subcontractor), whichever occurs later. Further, Contractors not signatory to the established Joint Labor/Management Trust Fund Agreements, as described in the Schedule A Agreement for the craft workers in their employ, shall sign a "Subscription Agreement" with the appropriate Joint Labor/Management Trust Funds covering the work performed under this Agreement before work is commenced on the Project.

(c) The District agrees that to the extent permitted by law and consistent with the economy and efficiency of construction and operation, it will use its best efforts to purchase materials, equipment and supplies which will not create labor strife. Under all circumstances, however, the District shall retain the absolute right to select the lowest reliable and responsible bidder for the award of contracts on all projects.

Section 2.6 Coverage Exception. This Agreement shall not apply if the District receives funding or assistance from any Federal, State, local or other public entity for the Construction Contract if a requirement, condition or other term of receiving that funding or assistance, at the time of the awarding of the contract, is the District not require, bidders, contractors, subcontractors or other persons or entities to enter into an agreement with one or more labor organizations or enter into an agreement that contains any of the terms set forth herein. The District agrees that it will make every effort to establish the enforcement of this Agreement with any governmental agency or granting authority.

Section 2.7 Schedule A Agreements.

(a) The provisions of this Agreement, including the Schedule A Agreements, shall apply to the work covered by this Agreement, notwithstanding the provisions of any other local, area and/or national agreement which may conflict with or differ from the terms of this Agreement. However, such does not apply to work performed under the National Cooling Tower Agreement, the National Stack Agreement, the National Transit Division Agreement (NTD), or within the jurisdiction of the International Union of Elevator Constructors and all instrument calibration and loop checking work performed under the terms of the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians, except that Articles dealing with Work Stoppages and Lock-Outs, Work Assignments and Jurisdictional Disputes, and Settlement of Grievances and Disputes shall apply to such work. It is specifically agreed that no later agreement shall be deemed to have precedence over this Agreement unless signed by all Parties signatory hereto who are then currently employed or represented at the Project. Where a subject covered by the provisions of this Agreement is also covered by a Schedule A, the provisions of this Agreement shall apply. Where a subject is covered by a provision of a Schedule A and not covered by this Agreement, the provisions of the Schedule A shall prevail. Any dispute as to the applicable source between this Agreement and any Schedule A for determining the wages, hours of working conditions of employees on this Project shall be resolved under the procedures established in Article 10.

(b) It is understood that this Agreement, together with the referenced Schedule A Agreements, constitutes a self-contained, stand-alone agreement and by virtue of having become bound to this Continuity of Work Agreement, the Contractor will not be obligated to sign any other local, area or national collective bargaining agreement as a condition of performing work within the scope of this Agreement (provided, however, that the Contractor may be required to sign an uniformly applied, non-discriminatory Participation Agreement at the request of the trustees or administrator of a trust fund established pursuant to Section 302 of the Labor Management Relations Act, and to which such Contractor is bound to make contributions under this Agreement, provided that such Participation Agreement does not purport to bind the Contractor beyond the terms and conditions of this Agreement and/or expand its obligation to make contributions pursuant thereto). It shall be the responsibility of the prime Contractor to

have each of its subcontractors sign the documents with the appropriate Craft Union prior to the subcontractor beginning Project Work.

Section 2.8 Binding Signatories Only. This Agreement shall only be binding on the signatory Parties hereto, and shall not apply to the parents, affiliates, subsidiaries, or other ventures of any such Party.

Section 2.9 Other District Work. This Agreement shall be limited to the construction work within the Scope of this Agreement including, specifically, site preparation and related demolition, major rehabilitation, new construction and other work on the Projects referenced in Section 2.2 above. Nothing contained herein shall be interpreted to prohibit, restrict, or interfere with the performance of any other operation, work or function not covered by this Agreement, which may be performed by District Employees or contracted for by the District for its own account, on its property or in and around a Project site.

Section 2.10 Separate Liability. It is understood that the liability of the Contractor(s) and the liability of the separate Unions under this Agreement shall be several and not joint. The Unions agree that this Agreement does not have the effect of creating any joint employment status between or among the District or Project Labor Coordinator and/or any Contractor.

Section 2.11 Completed Project Work. As areas of covered work are accepted by the District, this Agreement shall have no further force or effect on such items or areas except where the Contractor is directed by the District or its representatives to engage in repairs, modification, check-out and/or warranties functions required by its contract(s) with the District.

ARTICLE 3
UNION RECOGNITION AND EMPLOYMENT

Section 3.1 Recognition. The Contractor recognizes the Council and the signatory local Unions as the exclusive bargaining representative for the employees engaged in Project Work.

Section 3.2 Contractor Selection of Employees. The Contractor shall have the right to determine the competency of all employees, the number of employees required, the duties of such employees within their craft jurisdiction, and shall have the sole responsibility for selecting employees to be laid off, consistent with Section 3.3 and Section 4.3, below. The Contractor shall also have the right to reject any applicant referred by a Union for any reason, subject to any reporting pay required by Section 6.6; provided, however, that such right is exercised in good faith and not for the purpose of avoiding the Contractor's commitment to employ qualified workers through the procedures endorsed in this Agreement.

Section 3.3 Referral Procedures.

(a) For signatory Unions now having a job referral system contained in a Schedule A, the Contractor agrees to comply with such system and it shall be used exclusively by such Contractor, except as modified by this Agreement. Such job referral system will be operated in a nondiscriminatory manner and in full compliance with federal, state, and local laws and regulations which require equal employment opportunities and non-discrimination. All of the foregoing hiring procedures, including related practices affecting apprenticeship, shall be

operated so as to consider the goals of the District to encourage employment of District residents and utilization of small local businesses on the Project, and to facilitate the ability of all Contractors to meet their employment needs.

The local Unions will exert their best efforts to recruit and refer sufficient numbers of skilled craft workers to fulfill the labor requirements of the Contractor, including specific employment obligations to which the Contractor may be legally and/or contractually obligated; and to refer apprentices as requested to develop a larger, skilled workforce. The local Unions will work with their affiliated regional and national unions, and jointly with the Project Labor Coordinator and others designated by the District, to identify and refer competent craft persons as needed for Project Work, and to identify and hire individuals, particularly residents of the District, for entrance into joint labor/management apprenticeship programs, or to participation in other identified programs and procedures to assist individuals in qualifying and becoming eligible for such apprenticeship programs, all maintained to increase the available supply of skilled craft personnel for Project Work and future construction of maintenance work to be undertaken by the District.

(b) The Union shall not knowingly refer an employee currently employed by a Contractor on Project Work to any other Contractor.

(c) The Parties are aware of the District's policy that Contractors and other employers shall not employ, on Project Work when minors may be present on or around the site of such Project Work during working hours, a person who would not be eligible for employment by the District under California Educational Code Section 45123. The Parties shall endeavor to employ persons under this Article in compliance with this policy, and the Contractors agree to remove such an individual in their employ from the particular Project site at the request of the District or the Project Labor Coordinator.

Section 3.4 Non-Discrimination in Referral, Employment, and Contracting. The Unions and Contractors agree that they will not discriminate against any employee or applicant for employment in hiring and dispatching on the basis of race, color, religion, sex, gender, national origin, age, membership in a labor organization, sexual orientation, political affiliation, marital status or disability. Further, it is recognized that the District has certain policies, programs, and goals for the utilization of local small business enterprises. The Parties shall jointly endeavor to assure that these commitments are fully met, and that any provisions of this Agreement which may appear to interfere within a local small business enterprises successfully bidding for work within the scope of this Agreement shall be carefully reviewed, and adjustments made as may be appropriate and agreed upon among the Parties, to ensure full compliance with the spirit and letter of the District's policies and commitment to its goals for the significant utilization of local small businesses as direct Contractors or suppliers Project Work.

Section 3.5 Employment of District Residents.

(a) In recognition of the District's mission to serve the residents residing within the zip codes within the District's geographic area ("Local Residents"), the Unions and Contractors will exert their best efforts, to the extent allowed by law, to refer and/or recruit sufficient numbers of skilled craft Local Residents to fulfill the requirements of the Employers performing Project Work first from qualified employees who are District residents. If the 30%

local hire goal is not attained utilizing Local Residents, the outreach shall expand to qualified employees who reside within the zip codes covering the territorial boundaries of any city bordering on the geographical area which makes up the District. If 30% local hire is still not attained utilizing these Local Residents, the outreach shall expand to other qualified employees whose names appear on the signatory Unions' out of work list. For purposes of this Agreement, Local Residents shall include persons residing within those U.S. Postal Service zip codes whose territorial boundaries overlap with the territorial boundaries of the District, which, as of the date of this Agreement include ***91744, 91745, 91746, 91748, 91790 and 91792***. In the event any or all of the foregoing zip codes cease to include territory lying within the territorial boundaries of the District, such zip codes shall be excluded from the range of eligible zip codes. Conversely, if any new zip codes are created whose territory overlaps with the territory of the District, such zip codes shall be included within the list of eligible zip codes.

(b) A goal of 30% of all of the labor and craft positions shall be from workers residing within the District area described in (a) above. To facilitate the dispatch of local residents, all Contractors will be required to utilize the Craft Employee Request Form whenever they are requesting the referral of any employee from a Union referral list for any Covered Project, a sample of which is attached as ***Attachment C***.

(c) The Project Labor Coordinator shall work with the Unions and Contractors in the administration of this local residency preference; and the Contractors and Unions shall cooperate by maintaining adequate records to demonstrate to the Project Labor Coordinator that such preferences have been pursued. As part of this process, and in order to facilitate the contract administration procedures, as well as appropriate benefit fund coverage, all Contractors shall require their "core work force" and any other persons employed other than through the referral process, to register with the appropriate hiring hall, if any, prior to beginning work on the Project.

Section 3.6 Helmets to Hardhats. The Contractors and the Unions recognize a desire to facilitate the entry into the building and construction trades of veterans who are interested in careers in the building and construction industry. The Contractors and Unions agree to utilize the services of the Center for Military Recruitment, Assessment and Veterans Employment (hereinafter "Center") and the Center's "Helmets to Hardhats" program to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the Parties. For purposes of this Agreement the term "Eligible Veteran" shall have the same meaning as the term "veteran" as defined under Title 5, Section 2108(1) of the United States Code as the same may be amended or re-codified from time to time. It shall be the responsibility of each qualified District resident to provide the Unions with proof of his/her status as an Eligible Veteran.

The Unions and Contractors agree to coordinate with the Center to create and maintain an integrated database of veterans interested in working on this Project and of apprenticeship and employment opportunities for this Project. To the extent permitted by law, the Unions will give credit to such veterans for bona fide, provable past experience.

Section 3.7 Core Employees.

(a) Except as otherwise provided in separate collective bargaining agreement(s) to which the Contractor is signatory, Contractors and specialty or sub-contractors may employ, as needed, first, a member of its core workforce, then an employee through a referral from the appropriate Union hiring hall, then a second core employee, then a second employee through the referral system, and so on until a maximum of five (5) core employees are employed, thereafter, all additional employees in the affected trade or craft shall be requisitioned from the craft hiring hall in accordance with Section 3.3. In the laying off of employees, the number of core employees shall not exceed one-half plus one of the workforce for an employer with 10 or fewer employees, assuming the remaining employees are qualified to undertake the work available. This provision applies only to employees not currently working under a current Schedule A Agreement and is not intended to limit the transfer provisions of the Schedule A Agreement of any trade.

(b) The core work force is comprised of those employees: (i) whose names appeared on the Contractor's active payroll for sixty (60) of the one hundred (100) working days immediately before award of Project Work to the Contractor;

(ii) who possess any license required by state or federal law for the Project Work to be performed;

(iii) who have the ability to safely perform the basic functions of the applicable trade; and

(iv) who are residents of the District on the effective date of this Agreement, or have been residing within the zip codes identified in Section 3(a) as the geographic area served by the District for the one hundred (100) working days immediately prior to the award of Project Work to the Contractor.

(c) Prior to each Contractor performing any work on the Project, each Contractor shall provide a list of his core employees to the Project Labor Coordinator and the Council. Failure to do so will prohibit the Contractor from using any core employees. Upon request by any Party to this Agreement, the Contractor hiring any core employee shall provide satisfactory proof (i.e., payroll records, quarterly tax records, driver's license, voter registration, postal address and such other documentation) evidencing the core employee's qualification as a core employee to the Project Labor Coordinator and the Council.

(d) This Section 3.7 shall only apply to employees who are not working under the terms of a Schedule A Agreement at the time of their transfer to work covered under this Agreement and is not intended to limit the transfer provisions of the Schedule A Agreements of any of the Unions signatory hereto.

Section 3.8 Time for Referral. If any Union's registration and referral system does not fulfill the requirements for specific classifications of covered employees (including residency standards) requested by any Contractor within forty-eight (48) hours (excluding Saturdays, Sundays and holidays), that Contractor may use employment sources other than the Union registration and referral services, and may employ applicants meeting such standards from any other available source. The Contractor shall, within forty-eight (48) hours of such applicant

being hired, inform the Union of any applicants hired from other sources, and such applicants shall register with the appropriate hiring hall, if any.

Section 3.9 Lack of Referral Procedure. If a signatory local Union does not have a job referral system as set forth in Section 3.3 above, the Contractors shall give the Union equal opportunity to refer applicants. The Contractors shall notify the Union of employees so hired, as set forth in Section 3.5.

Section 3.10 Union Membership. No employee covered by this Agreement shall be required to join any Union as a condition of being employed, or remaining employed, for the completion of Project Work; provided, however, that any employee who is a member of the referring Union at the time of referral shall maintain that membership in good standing while employed under this Agreement. All employees shall, however, be required to comply with the Union security provisions of the applicable Schedule A for the period during which they are performing on-site Project Work to the extent, as permitted by law, of rendering payment of the applicable monthly and working dues only, as uniformly required of all craft employees while working on the Project and represented by the applicable signatory Union.

Section 3.11 Individual Seniority. Except as provided in Section 4.3, individual seniority shall not be recognized or applied to employees working on the Project; provided, however, that group and/or classification seniority in a Union's Schedule A as of the effective date of this Agreement shall he recognized for purposes of layoffs.

Section 3.12 Foremen. The selection and number of craft foreman and/or general foreman shall be the responsibility of the Contractor. All foremen shall take orders exclusively from the designated Contractor representatives. Craft foreman shall be designated as working foreman at the request of the Contractors.

Section 3.13 District Security Requirements. The Parties are aware of the District's policy that Contractors and other employers shall not employ a person who would not be eligible for employment by the District under Education Code Section 45123. All persons working on Project Work, including all employees hired by a Contractor (or referred by a Signatory Union) to work on Project Work shall be required to comply with all criminal background check certification requirements and policies of District for those persons who may come in contact with, or work in close proximity to, minors in the course of performing work on a Project. Contractors may refuse to employ any person who declines to comply with District's background check requirements or who otherwise is determined to be disqualified from participating in Project Work because of a disqualifying conviction. Similarly, District may ban or order the immediate removal of any person disqualified from working in the presence of, or in close proximity to, minors.

ARTICLE 4
UNION ACCESS AND STEWARDS

Section 4.1 Access to Project Sites. Authorized representatives of the Union shall have access to Project Work, provided that they do not interfere with the work of employees and further provided that such representatives fully comply with posted visitor, security and safety rules.

Section 4.2 Stewards.

(a) Each signatory local Union shall have the right to dispatch a working journeyperson as a steward for each shift, and shall notify the Contractor in the writing of the identity of the designated steward or stewards prior to the assumption of such person's duties as steward. Such designated steward or stewards shall not exercise any supervisory functions. There will be no non-working stewards. Stewards will receive the regular rate of pay for their respective crafts.

(b) In addition to his/her work as an employee, the steward should have the right to receive, but not to solicit, complaints or grievances and to discuss and assist in the adjustment of the same with the employee's appropriate supervisor. Each steward should he concerned only with the employees of the steward's Contractor and, if applicable, subcontractor(s), and not with the employees of any other Contractor. A Contractor will not discriminate against the steward in the proper performance of his/her Union duties.

(c) When a Contractor has multiple, non-contiguous work locations at one site, the Contractor may request and the Union shall appoint such additional working stewards as the Contractor requests to provide independent coverage of one or more such locations. In such cases, a steward may not service more than one work location without the approval of the Contractor.

(d) The stewards shall not have the right to determine when overtime shall be worked or who shall work overtime.

Section 4.3 Steward Layoff/Discharge. The relevant Contractor agrees to notify the appropriate Union twenty-four (24) hours before the layoff of a steward, except in the case of disciplinary discharge for just cause. If the steward is protected against such layoff by the provisions of the applicable Schedule A, such provisions shall be recognized when the steward possesses the necessary qualifications to perform the remaining work. In any case in which the steward is discharged or disciplined for just cause, the appropriate Union will be notified immediately by the Contractor, and such discharge or discipline shall not become final (subject to any later filed grievance) until twenty-four (24) hours after such notice have been given.

Section 4.4 Employees on Non-Project Work. On work where the personnel of the District may be working in close proximity to the construction activities covered by this Agreement, the Union agrees that the Union representatives, stewards, and individual workers will not interfere with the District personnel, or with personnel employed by the any other employer not a Party to this Agreement.

ARTICLE 5
WAGES AND BENEFITS

Section 5.1 Wages. All employees covered by this Agreement shall be classified in accordance with work performed and paid by the Contractors the hourly wage rates for those classifications in compliance with the applicable prevailing wage rate determination established pursuant to applicable law. If a prevailing rate increases under law, the Contractor shall pay that rate as of its effective date under the law. This Agreement does not relieve Contractors from any

independent contractual or other obligation they may have to pay wages in excess of the prevailing wage rate as required.

Section 5.2 Benefits.

(a) Contractors shall pay contributions to the established employee benefit funds in the amounts designated in the appropriate Schedule A and make all employee – authorized deductions in the amounts designated in the appropriate Schedule A: provided, however, that the Contractor and Union agree that only such bona fide employee benefits as accrue to the direct benefit of the employees (such as pension and annuity, health and welfare, vacation, apprenticeship, training funds, etc.) shall be included in this requirement and required to be paid by the Contractor on the Project: and provided further, however, that such contributions shall not exceed the contribution amounts set forth in the applicable prevailing wage determination. Notwithstanding Section 2.7(a), Contractors directly signatory to one or more of the Schedule A Agreements are required to make all contributions set forth in those Schedule A Agreements without reference to the forgoing. Bona fide jointly-trusteed benefit plans or authorized employee deduction programs established or negotiated under the applicable Schedule A or by the Parties to this Agreement during the life of this Agreement may be added.

(b) The Contractor adopts and agrees to be bound by the written terms of the applicable, legally established, trust agreement(s) specifying the detailed basis on which payments are to be made into, and benefits paid out of, such trust funds for its employees. The Contractor authorizes the Parties to such trust funds to appoint trustees and successor trustees to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor.

(c) Each Contractor and subcontractor is required to certify to the Project Labor Coordinator that it has paid all benefit contributions due and owing to the appropriate Trust(s) prior to the receipt of its final payment and/or retention. Further, upon timely notification by a Union to the Project Labor Coordinator, the Project Labor Coordinator shall work with any prime Contractor or subcontractor who is delinquent in payments to assure that proper benefit contributions are made, to the extent of requesting the District or the prime Contractor to withhold payments otherwise due such Contractor, until such contributions have been made or otherwise guaranteed.

Section 5.3 Wage Premiums. Wage premiums, including but not limited to pay based on height of work, hazard pay, scaffold pay and special skills shall not be applicable to work under this Agreement, except to the extent provided for in any applicable prevailing wage determination.

Section 5.4 Compliance with Prevailing Wage Laws. The Parties agree that the Project Labor Coordinator shall monitor the compliance by all Contractors and subcontractors with all applicable federal and state prevailing wage laws and regulations, and that such monitoring shall include Contractors engaged in what would otherwise be Project Work but for the exceptions to Agreement coverage in Article 2, Section 2.2. All complaints regarding possible prevailing wage violations shall be referred to the Project Labor Coordinator for processing, investigation and resolution, and if not resolved within thirty calendar days, may be referred by any party to the state labor commissioner.

ARTICLE 6
HOURS OF WORK, OVERTIME, SHIFTS AND HOLIDAYS

Section 6.1 Hours of Work. Eight (8) hours per day between the hours of 6:00 a.m. and 5:30 p.m., plus one-half (½) hour unpaid lunch approximately mid-way through the shift, shall constitute the standard work day. Forty (40) hours per week shall constitute a regular week's work. The work week will start on Sunday and conclude on Saturday. The foregoing provisions of this Article are applicable unless otherwise provided in the applicable prevailing wage determination, or unless changes are permitted by law and such are agreed upon by the Parties. Nothing herein shall be construed as guaranteeing any employee eight (8) hours per day or forty (40) hours per week, or a Monday through Friday work standard work schedule.

Section 6.2 Place of Work. Employees shall be at their place of work (as designated by the Contractor), at the starting time and shall remain at their place of work, performing their assigned functions, until quitting time. The place of work is defined as the gang or tool box or equipment at the employee's assigned work location or the place where the foreman gives instructions. The Parties reaffirm their policy of a fair day's work for a fair day's wage. There shall be no pay for time not worked unless the employee is otherwise engaged at the direction of the Contractor.

Section 6.3 Overtime. Overtime shall be paid in accordance with the requirements of the applicable prevailing wage determination. There shall be no restriction on the Contractor's scheduling of overtime or the nondiscriminatory designation of employees who will work overtime. There shall be no pyramiding of overtime (payment of more than one form of overtime compensation for the same hour) under any circumstances.

Section 6.4 Shifts and Alternate Work Schedules.

(a) Alternate starting and quitting time and/or shift work may be performed at the option of the Contractor upon three (3) days' prior notice to the affected Union(s), unless a shorter notice period is provided for in the applicable Schedule A, and shall continue for a period of not less than five (5) working days. Saturdays and Sundays, if worked, may be used for establishing the five (5) day minimum work shift. If two shifts are worked, each shall consist of eight (8) hours of continuous work exclusive of a one-half (½) hour non-paid lunch period, for eight (8) hours pay. The last shift shall start on or before 6:00 p.m. The first shift starting at or after 6:00 a.m. is designated as the first shift, with the second shift following.

(b) Contractors, the Council and the Union recognize the economic impact upon the District and District residents of the massive Project being undertaken by the District and agree that all Parties to this Agreement desire and intend Project Work to be undertaken in a cost efficient and effective manner to the highest standard of quality and craftsmanship. Recognizing the economic conditions, the Parties agree that, except to the extent permitted by law, employees performing Project Work shall not be entitled to any differentials or additional pay based upon the shift or work schedule of the employees. Instead, all employees working on Project Work shall be paid at the same base rate regardless of shift or work schedule worked.

(c) Because of operational necessities, the second shift may, at the District's direction, be scheduled without the preceding shift having been worked. It is recognized that the District's operations and/or mitigation obligations may require restructuring of normal work

schedules. Except in an emergency or when specified in the District's bid specification, the Contractor shall give affected Union(s) at least three (3) days' notice of such schedule changes.

Section 6.5 Holidays. Recognized holidays on this Project shall be those set forth and governed by the prevailing wage determination(s) applicable to this Project, unless or until such may be, and are, revised by mutual agreement of the Parties to this Agreement.

Section 6.6 Show-up Pay.

(a) Except as otherwise required by State law, Employees reporting for work and for whom no work is provided, except when given prior notification not to report to work, shall receive two (2) hours pay at the regular straight time hourly rate. Employees who are directed to start work shall receive four (4) hours of pay at the regular straight time hourly rate. Employees who work beyond four (4) hours shall be paid for actual hours worked. Whenever reporting pay is provided for employees, they will be required to remain at the Project Site and available for work for such time as they receive pay, unless released earlier by the principal supervisor of the Contractor(s) or his/her designated representative. Each employee shall furnish his/her Contractor with his/her current address and telephone number, and shall promptly report any changes to the Contractor.

(b) An employee called out to work outside of his/her shift shall receive a minimum of two (2) hours pay at the appropriate rate. This does not apply to time worked as an extension of (before or after) the employee's normal shift.

(c) When an employee leaves the job or work location of his/her own volition, or is discharged for cause or is not working as a result of the Contractor's invocation of Article XII, Section 12.3, the employee shall only be paid for actual time worked.

Section 6.7 Meal Periods. The Contractor will schedule a meal period of no more than one-half hour duration at the work location at approximately mid-point of the schedule shift; provided, however, that the Contractor may, for efficiency of the operation, establish a schedule which coordinates the meal periods of two or more crafts. An employee may be required to work through his meal period because of an emergency or a threat to life or property, or for such other reasons as are in the applicable Schedule A, and if he is so required, he shall be compensated in the manner established in the applicable Schedule A.

Section 6.8 Make-up Days. To the extent permitted by the applicable general wage determination, when an employee has been prevented from working for reasons beyond the control of the employer, including, but not limited to inclement weather or other natural causes, during the regularly scheduled work week, a make-up day may be worked on a non-regularly scheduled work day for which an employee shall receive eight (8) hours pay at the straight time rate of pay or any premium rate required for such hours under the prevailing wage law.

ARTICLE 7
WORK STOPPAGES AND LOCK-OUTS

Section 7.1 No Work Stoppages or Disruptive Activity. The Council and the Unions signatory hereto agree that neither they, and each of them, nor their respective officers or agents or representatives, shall incite or encourage, condone or participate in any strike, walk-out, slow-

down, picketing, observing picket lines or other activity of any nature or kind whatsoever, for any cause or dispute whatsoever with respect to or any way related to Project Work, or which interferes with or otherwise disrupts, Project Work, or with respect to or related to the District or Contractors or subcontractors, including, but not limited to, economic strikes, unfair labor practice strikes, safety strikes, sympathy strikes and jurisdictional strikes whether or not the underlying dispute is arbitrable. Any such actions by the Council, or Unions, or their members, agents, representatives or the employees they represent shall constitute a violation of this Agreement. The Council and the Union shall take all steps necessary to obtain compliance with this Article and neither should be held liable for conduct for which it is not responsible.

Section 7.2 Employee Violations. The Contractor may discharge any employee violating Section 7.1 above and any such employee will not be eligible for rehire under this Agreement.

Section 7.3 Standing to Enforce. The District, the Project Labor Coordinator, or any Contractor affected by an alleged violation of Section 7.1 shall have standing and the right to enforce the obligations established therein.

Section 7.4 Expiration of Schedule A Agreements. If the Schedule A Agreement, or any local, regional, and other applicable collective bargaining agreements expire during the term of the Project, the Union(s) agree that there shall be no work disruption of any kind as described in Section 7.1 above as a result of the expiration of any such agreement(s) having application on this Project and/or failure of the involved Parties to that agreement to reach a new contract. Terms and conditions of employment established and set at the time of bid shall remain established and set. Otherwise to the extent that such agreement does expire and the Parties to that agreement have failed to reach concurrence on a new contract, work will continue on the Project on one of the following two (2) options, both of which will be offered by the Unions involved to the Contractors affected:

(a) Each of the Unions with a contract expiring must offer to continue working on the Project under interim agreements that retain all the terms of the expiring contract, except that the Unions involved in such expiring contract may each propose wage rates and employer contribution rates to employee benefit funds under the prior contract different from what those wage rates and employer contributions rates were under the expiring contracts. The terms of the Union's interim agreement offered to Contractors will be no less favorable than the terms offered by the Union to any other employer or group of employers covering the same type of construction work in Los Angeles County.

(b) Each of the Unions with a contract expiring must offer to continue working on the Project under all the terms of the expiring contract, including the wage rates and employer contribution rates to the employee benefit funds, if the Contractor affected by that expiring contract agrees to the following retroactive provisions: if a new Schedule A Agreement, local, regional or other applicable labor agreement for the industry having application at the Project is ratified and signed during the term of this Agreement and if such new labor agreement provides for retroactive wage increases, then each affected Contractor shall pay to its employees who performed work covered by this Agreement at the Project during the hiatus between the effective dates of such expired and new labor agreements, an amount equal to any such retroactive wage increase established by such new labor agreement, retroactive to whatever date

is provided by the new labor agreement for such increase to go into effect, for each employee's hours worked on the Project during the retroactive period. All Parties agree that such affected Contractors shall be solely responsible for any retroactive payment to its employees.

(c) Some Contractors may elect to continue to work on the Project under the terms of the interim agreement option offered under paragraph (a) above and other Contractors may elect to continue to work on the Project under the retroactivity option offered under paragraph (b) above. To decide between the two options, Contractors will be given one week after the particular labor agreement has expired or one week after the Union has personally delivered to the Contractors in writing its specific offer of terms of the interim agreement pursuant to paragraph (a) above, whichever is the later date. If the Contractor fails to timely select one of the two options, the Contractor shall be deemed to have selected option (b).

Section 7.5 No Lockouts. Contractors shall not cause, incite, encourage, condone or participate in any lock-out of employees with respect to Project Work during the term of this Agreement. The term "lock-out" refers only to a Contractor's exclusion of employees in order to secure collective bargaining advantage, and does not refer to the discharge, termination or layoff of employees by the Contractor for any reason in the exercise of rights pursuant to any provision of this Agreement, or any other agreement, nor does "lock-out" include the District's decision to stop, suspend or discontinue any Project Work or any portion thereof for any reason.

Section 7.6 Best Efforts to End Violations.

(a) If a Contractor contends that there is any violation of this Article or Section 8.3, it shall notify, in writing, the Executive Secretary of the Council, the Senior Executive of the involved Union(s) and the Project Labor Coordinator. The Executive Secretary and the leadership of the involved Union(s) will immediately instruct, order and use their best efforts to cause the cessation of any violation of the relevant Article.

(b) If the Union contends that any Contractor has violated this Article, it will notify that the Contractor and the Project Labor Coordinator, setting forth the facts which the Union contends violate the Agreement, at least twenty-four (24) hours prior to invoking the procedures of Section 7.8. The Project Labor Coordinator shall promptly order the involved Contractor(s) to cease any violation of the Article.

Section 7.7 Withholding of services for failure to pay wages and fringe benefits. Notwithstanding any provision of this Agreement to the contrary, it shall not be a violation of this Agreement for any Union to withhold the services of its members (but not the right to picket) from a particular Contractor who:

(a) fails to timely pay its weekly payroll; or

(b) fails to make timely payments to the Union's Joint Labor/Management Trust Funds in accordance with the provisions of the applicable Schedule A Agreements. Prior to withholding its members services for the Contractor's failure to make timely payments to the Union's Joint Labor/Management Trust Funds, the Union shall give at least ten (10) days (unless a lesser period of time is provided in the Union's Schedule A Agreement, but in no event less than forty-eight (48) hours) written notice of such failure to pay by registered or certified mail,

return receipt requested, and by facsimile transmission to the involved Contractor. Union will meet within the ten (10) day period to attempt to resolve the dispute.

(c) Upon the payment of the delinquent Contractor of all monies due and then owing for wages and/or fringe benefit contributions, the Union shall direct its members to return to work and the Contractor shall return all such members back to work.

Section 7.8 Expedited Enforcement Procedure. Any party, including the District, which the Parties agree is a Party to the Agreement for purposes of this Article and an intended beneficiary of this Article, or the Project Labor Coordinator, may institute the following procedures, in lieu of or in addition to any other action at law or equity, when a breach of Section 7.1 or 7.5, above, or Section 8.3 is alleged.

(a) The Party invoking this procedure shall notify the permanent arbitrator next in sequence from the list of neutral arbitrators mutually agreed to by the Parties under ***Attachment D*** (hereinafter, the "Permanent Neutral Arbitrators"). The Parties agree these shall be the permanent neutral arbitrators under this procedure. In the event that none of the Permanent Neutral Arbitrators are available for a hearing within twenty-four (24) hours, the Party invoking the procedure shall have the option of delaying the proceedings until one of the Permanent Neutral Arbitrators is available or the Parties shall make a joint request of the State Mediation and Conciliation Service of the California Department of Industrial Relations (hereinafter, "SMCS")[1] for a list of five (5) qualified neutral arbitrators with labor and employment expertise reasonably related to the nature of the dispute. The Parties shall select a neutral arbitrator from the SMCS list by striking one name from the list in succession until only one name remains. If any of the Permanent Neutral Arbitrators ask to be relieved from their status as a Permanent Neutral Arbitrator, the Parties shall mutually select a new Permanent Neutral Arbitrator by again submitting a joint request to the SMCS for a list of five (5) qualified arbitrators with the new arbitrator selected by striking names from the list until only one name remains, who has been selected by the negotiating Parties, and whom the Parties agree shall be the permanent arbitrator under this procedure. If the permanent arbitrator is unavailable at any time, the party invoking this procedure shall notify one of the alternates selected by the Parties, in that order on an alternating basis. Expenses incurred in arbitration shall be borne equally by the Parties involved in the arbitration and the decision of the arbitrator shall be final and binding on the Parties; provided, however, that the arbitrator shall only have the authority to interpret and apply the provisions of this Agreement. Notice to the arbitrator shall be by the most expeditious means available, with notices to the Parties alleged to be in violation, and to the Council if it is a Union alleged to be in violation. For purposes of this Article, written notice may be given by telegram, facsimile, hand delivery or overnight mail and will be deemed effective upon receipt.

(b) Upon receipt of said notice, the arbitrator named above or his/her alternate shall sit and hold a hearing within twenty-four (24) hours if it is contended that the violation still exists, but not sooner than twenty-four (24) hours after notice has been dispatched to the Executive Secretary and the Senior Official(s) as required by Section 7.6, as above.

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[1] As of the effective date of this Agreement, the offices of the SMCS can be contacted at the following address and/or by means of the following e-mail address and facsimile number: 1515 Clay Street, Suite 2206, Oakland, California 94612. E-mail: SMCSInfo@dir.ca.gov , Facsimile Number: (510) 873-6475.

(c) The arbitrator shall notify the Parties of the place and time chosen for this hearing. Said hearing shall be completed in one session, which, with appropriate recesses at the arbitrator's discretion, shall not exceed twenty-four (24) hours unless otherwise agreed upon by all Parties. A failure of any Party or Parties to attend said hearings shall not delay the hearing of evidence or the issuance of any award by the arbitrator.

(d) The sole issue at the hearing shall be whether or not a violation of Sections 7.1 or 7.5, above, or Section 8.3 has in fact occurred. The arbitrator shall have no authority to consider any matter in justification, explanation or mitigation of such violation or to award damages, (except for damages as set forth in 7.8 below) which issue is reserved for court proceedings, if any. The award shall be issued in writing within three (3) hours after the close of the hearing, and may be issued without an opinion. If any Party desires a written opinion, one shall be issued within fifteen (15) days, but its issuance shall not delay compliance with, or enforcement of, the Award. The arbitrator may order cessation of the violation of the Article and other appropriate relief, and such award shall be served on all Parties by hand or registered mail upon issuance.

(e) Such award shall be final and binding on all Parties and may be enforced by any court of competent jurisdiction upon the filing of this Agreement and all other relevant documents referred to herein above in the following manner. Written notice of the filing of such enforcement proceedings shall be given to the other Party. In any judicial proceeding to obtain a temporary order enforcing the arbitrator's award as issued under Section 7.7(d) of this Article, all Parties waive the right to a hearing and agree that such proceedings may be ex parte. Such agreement does not waive any Party's right to participate in a hearing for a final order of enforcement. The court's order or orders enforcing the arbitrator's award shall be served on all Parties by hand or by delivery to their address as shown on this Agreement (for a Union), as shown on their business contract for work under this Agreement (for a Contractor) and to the representing Union (for an employee), by certified mail by the Party or Parties first alleging the violation.

(f) Any rights created by statute or law governing arbitration proceedings inconsistent with the above procedure or which interfere with compliance hereto are hereby waived by the Parties to whom they accrue.

(g) The fees and expenses of the arbitrator shall be equally divided between the Party or Parties initiating this procedure and the respondent Party or Parties.

ARTICLE 8
WORK ASSIGNMENTS AND JURISDICTIONAL DISPUTES

Section 8.1 Assignment of Work. The assignment of work will be solely the responsibility of the Contractor performing the work involved; and such work assignments will be in accordance with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (the "Plan") currently in effect, or any successor plan.

Section 8.2 The Plan. All jurisdictional disputes between or among Building and Construction Trades Unions and Contractors, shall be settled and adjusted according to the Plan, or any other plan or method of procedures that may be adopted in the future by the Building and

Construction Trades Department. Decisions rendered shall be final, binding and conclusive on the Contractors and Union.

(a) For the convenience of the parties, and in recognition of the expense of travel between Southern California and Washington D.C., at the request of any party to a jurisdictional dispute under this Agreement an Arbitrator shall be chosen by the procedures specified in Article V, Section 5, of the Plan from a list composed of John Kagel, Thomas Angelo, Robert Hirsh, and Thomas Pagan, and the Arbitrator's hearing on the dispute shall be held at the offices of the Council. All other procedures shall be as specified in the Plan.

Section 8.3 No Work Disruption Over Jurisdiction. All jurisdictional disputes shall be resolved without the occurrence of any strike, work stoppage, disruption, or slowdown of any nature, and the Contractor's assignments shall be adhered to until the dispute is resolved. Individuals violating this section shall he subject to immediate discharge.

Section 8.4 Pre-Job Conferences. As provided in Article 16, each Contractor will conduct a pre-job conference with the appropriate affected Union(s) prior to commencing work. The Council and the Project Labor Coordinator shall be advised in advance of all such conferences and may participate if they wish.

Section 8.5 Resolution of Jurisdictional Disputes. If any actual or threatened strike, sympathy strike, work stoppage, slow down, picketing, hand-billing or otherwise advising the public that a labor dispute exists, or interference with the progress of Project Work by reason of a jurisdictional dispute or disputes occurs, the Parties shall exhaust the expedited procedures set forth in the Plan, if such procedures are in the plan then currently in effect, or otherwise as in Article 7 above.

ARTICLE 9
MANAGEMENT RIGHTS

Section 9.1 Contractor and District Rights. The Contractors and the District have the sole and exclusive right and authority to oversee and manage construction operations on Project Work without any limitations unless expressly limited by a specific provision of this Agreement. In addition to the following and other rights of the Contractors enumerated in this Agreement, the Contractors expressly reserve their management rights and all the rights conferred upon them by law. The Contractor's rights include, but are not limited to, the right to:

(a) Plan, direct and control operations of all work;

(b) Hire, promote, transfer and layoff their own employees, respectively, as deemed appropriate to satisfy work and/or skill requirements;

(c) Promulgate and require all employees to observe reasonable job rules and security and safety regulations;

(d) Discharge, suspend or discipline their own employees for just cause;

(e) Utilize, in accordance with District approval, any work methods, procedures or techniques, and select, use and install any types or kinds of materials, apparatus or

equipment. regardless of source of manufacture or construction; assign and schedule work at their discretion: and

(f) Assign overtime. determine when it will be worked and the number and identity of employees engaged in such work. subject to such provisions in the applicable Schedule A(s) requiring such assignments be equalized or otherwise made in a nondiscriminatory manner.

Section 9.2 Specific District Rights. In addition to the following and other rights of the District enumerated in this Agreement. the District expressly reserves its management rights and all the rights conferred on it by law. The District's rights (and those of the Contractor Administrator on its behalf) include but are not limited to the right to:

(a) Inspect any construction site or facility to ensure that the Contractor follows the applicable safety and other work requirements;

(b) Require Contractors to establish a different work week or shift schedule for particular employees as required to meet the operational needs of the Project Work at a particular locations or in order to accommodate the instructional programs and pupil control problems at various project sites where school may be in session during periods of construction activity;

(c) At its sole option. terminate. delay and/or suspend any and all portions of the covered work at any time; prohibit some or all work on certain days or during certain hours of the day to accommodate the ongoing operations of the District's educational facilities and/or to mitigate the effect of ongoing Project Work on businesses and residents in the neighborhood of the Project site: and/or require such other operational or schedule changes it deems necessary. in its sole judgment. to effectively maintain its primary mission and remain a good neighbor to those in the area of its facilities. (In order to permit the Contractors and Unions to make appropriate scheduling plans, the District will provide the Project Labor Coordinator. and the affected Contractor(s) and Union(s) with reasonable notice of any changes it requires pursuant to this section; provided. however, that if notice is not provided in time to advise employees not to report for work. show-up pay shall be due pursuant to the provision of Article 6. Section 6.6);

(d) Approve any work methods. procedures and techniques used by Contractors whether or not these methods. procedures or techniques are part of industry practices or customs; and

(e) Investigate and process complaints. through its Project Labor Coordinator. in the matter set forth in Articles 7 and 10.

Section 9.3 Use of Materials. There should be no limitations or restriction by Union upon a Contractor's choice of materials or design. nor. regardless of source or location. upon the full use and utilization. of equipment, machinery. packaging. precast. prefabricated. prefinished. or preassembled materials. tools or other labor saving devices. subject to the application of the State Public Contracts and Labor Codes as required by law in reference to offsite construction. Generally. the onsite installation or application of such items shall be performed by the craft having jurisdiction over such work. The District and its Project Labor Coordinator shall advise

all Contractors of, and enforce as appropriate, the off-site application of the prevailing wage law as it affects Project Work.

Section 9.4 Special Equipment, Warranties and Guaranties.

(a) It is recognized that certain equipment of a highly technical and specialized nature may be installed at Project Work sites. The nature of the equipment, together with the requirements for manufacturer's warranties, may dictate that it be prefabricated pre-piped and/or pre-wired and that it be installed under the supervision and direction of the District's and/or manufacturer's personnel. The Unions agree that such equipment is to be installed without incident.

(b) The Parties recognize that the Contractor will initiate from time to time the use of new technology, equipment, machinery, tools, and other labor-savings devices and methods of performing Project Work. The Union agrees that they will not restrict the implementation of such devices or work methods. The Unions will accept and will not refuse to handle, install or work with any standardized and/or catalogue: parts, assemblies, accessories, prefabricated items, preassembled items, partially assembled items, or materials whatever their source of manufacture or construction.

(c) If any disagreement between the Contractor and the Unions concerning the methods of implementation or installation of any equipment, or device or item, or method of work, arises, or whether a particular part or pre-assembled item is a standardized or catalog part or item, the work will precede as directed by the Contractor and the Parties shall immediately consult over the matter. If the disagreement is not resolved, the affected Union(s) shall have the right to proceed through the procedures set forth in Article 10.

Section 9.5 No Less Favorable Treatment. The Parties expressly agree that Project Work will not receive less favorable treatment than that on any other project which the Unions, Contractors and employees work.

ARTICLE 10
SETTLEMENT OF GRIEVANCES AND DISPUTES

Section 10.1 Cooperation and Harmony on Site.

(a) This Agreement is intended to establish and foster continued close cooperation between management and labor. The Council shall assign a representative to this Project for the purpose of assisting the local Unions, and working with the Project Labor Coordinator, together with the Contractors, to complete the construction of the Project economically, efficiency, continuously and without any interruption, delays or work stoppages.

(b) The Project Labor Coordinator, the Contractors, Unions, and employees collectively and individually, realize the importance to all Parties of maintaining continuous and uninterrupted performance Project Work, and agree to resolve disputes in accordance with the grievance provisions set forth in this Article or, as appropriate, those of Article 7 or 8.

(c) The Project Labor Coordinator shall oversee the processing of grievances under this Article and Articles 7 and 8, including the scheduling and arrangements of facilities

for meetings, selection of the arbitrator from the agreed-upon panel to hear the case, and any other administrative matters necessary to facilitate the timely resolution of any dispute; provided, however, it is the responsibility of the principal parties to any pending grievance to insure the time limits and deadlines are met.

Section 10.2 Processing Grievances. Any questions arising out of and during the term of this Agreement involving its interpretation and application, which includes applicable provisions of the Schedule A Agreements, but not jurisdictional disputes or alleged violations of Section 7.1 and 7.4 and similar provisions, shall be considered a grievance and subject to resolution under the following procedures.

Step 1. Employee Grievances. When any employee subject to the provisions of this Agreement feels aggrieved by an alleged violation of this Agreement, the employee shall, through his local Union business representative or, job steward, within ten (10) working days after the occurrence of the violation, give notice to the work site representative of the involved Contractor stating the provision(s) alleged to have been violated. A business representative of the local Union or the job steward and the work site representative of the involved Contractor shall meet and endeavor to adjust the matter within ten (10) working days after timely notice has been given. If they fail to resolve the matter within the prescribed period, the grieving party may, within ten (10) working days thereafter, pursue Step 2 of this grievance procedure provided the grievance is reduced to writing, setting forth the relevant information, including a short description thereof, the date on which the alleged violation occurred, and the provision(s) of the Agreement alleged to have been violated. Grievances and disputes settled at Step 1 shall be non-precedential except as to the parties directly involved.

Union or Contractor Grievances. Should the Union(s) or any Contractor have a dispute with the other Party(ies) and, if after conferring within ten (10) working days after the disputing Party knew or should have known of the facts or occurrence giving rise to the dispute, a settlement is not reached within five (5) working days, the dispute shall be reduced to writing and processed to Step 2 in the same manner as outlined in 1(a) above for the adjustment of an employee complaint.

Step 2. The business manager of the involved local Union or his designee, together with the site representative of the involved Contractor, and the labor relations representative of the Project Labor Coordinator, shall meet within seven (7) working days of the referral of the dispute to this second step to arrive at a satisfactory settlement thereof. If the Parties fail to reach an agreement, the dispute may be appealed in writing in accordance with the provisions of Step 3 within seven (7) calendar days after the initial meeting at Step 2.

Step 3. (a) If the grievance shall have been submitted but not resolved under Step 2, either the Union or Contractor Party may request in writing to the Project Labor Coordinator (with copy (ies) to the other Party (ies)) within seven (7) calendar days after the initial Step 2 meeting, that the grievance be submitted to an arbitrator selected from the agreed upon list on ***Attachment D*** hereto, on a rotational basis in the order listed. The decision of the arbitrator shall be final and binding on all Parties and the fee and expenses of such arbitrations shall be borne equally by the involved Contractor(s) and the involved Union(s).

(b) Failure of the grieving Party to adhere to the time limits established herein shall render the grievance null and void. The time limits established herein may be extended only by written consent of the Parties involved at the particular step where the extension is agreed upon. The arbitrator shall have the authority to make decisions only on issues presented and shall only have the authority to interpret and apply the provisions of this Agreement.

(c) The fees and expenses incurred by the arbitrator, as well as those jointly utilized by the Parties (i.e., conference room, court reporter, etc.) in arbitration, shall be divided equally by the Parties to the arbitration, including Union(s) and Contractor(s) involved.

Section 10.3 Limit on Use of Procedures. Procedures contained in this Article shall not be applicable to any alleged violation of Articles 7 or 8, with a single exception that any employee discharged for violation of Section 7.2, or Section 8.3, may resort to the procedures of this Article to determine only if he/she was, in fact, engaged in that violation.

Section 10.4 Notice. The Project Labor Coordinator (and the District, in the case of any grievance regarding the Scope of this Agreement), shall be notified by the involved Contractor of all actions at Steps 2 and 3, and further, the Project Labor Coordinator shall, upon its own request, be permitted to participate fully as a party in all proceedings at such steps.

ARTICLE 11
REGULATORY COMPLIANCE

Section 11.1 Compliance with All Laws. The Council and all Unions, Contractors, subcontractors and their employed shall comply with all applicable federal and state laws, ordinances and regulations including, but not limited to, those relating to safety and health, employment and applications for employment. All employees shall comply with the safety regulations established by the District, the Project Labor Coordinator or the Contractor. Employees must promptly report any injuries or accidents to a supervisor.

Section 11.2 Monitoring Compliance. The Parties agree that the District shall require, and that the Project Labor Coordinator and Council shall monitor, compliance by all Contractors and subcontractors with all federal and state laws regulation that, from time to time may apply to Project Work. It shall be the responsibility of both the Council and the Project Labor Coordinator (on behalf of the District) to investigate or monitor compliance with these various laws and regulations. The Council may recommend to the Project Labor Coordinator and/or the District procedures to encourage and enforce compliance with these laws and regulations.

Section 11.3 Prevailing Wage Compliance. The Council or Union shall refer all complaints regarding any potential prevailing wage violation to the Project Labor Coordinator, who on its own, or with the assistance of the District's labor compliance program, shall process, investigate and resolve such complaints, consistent with Article 5, Section 5.4. The Council or Union, as appropriate, shall be advised in a timely manner with regard to the facts and resolution, if any, of any complaint. It is understood that this Section does not restrict any individual rights as established under the State Labor Code, including the rights of an individual to file a complaint with the State Labor Commissioner.

Section 11.4 Violations of Law. Based upon a finding of violation by the District of a federal and state law, and upon notice to the Contractor that it or its subcontractors is in such violation, the District, in the absence of the Contractor or subcontractor remedying such violation, shall take such action as it is permitted by law or contract to encourage that Contractor to come into compliance, including, but not limited to, assessing fines and penalties and/or removing the offending Contractor from Project Work. Additionally, in accordance with the Agreement between the District and the Contractor, the District may cause the Contractor to remove from Project Work any subcontractor who is in violation of state or federal law.

ARTICLE 12
SAFETY AND PROTECTION OF PERSON AND PROPERTY

Section 12.1 Safety.

(a) It shall be the responsibility of each Contractor to ensure safe working conditions and employee compliance with any safety rules contained herein or established by the District, the Project Labor Coordinator or the Contractor. It is understood that employees have an individual obligation to use diligent care to perform their work in a safe manner and to protect themselves and the property of the Contractor and the District.

(b) Employees shall be bound by the safety, security and visitor rules established by the Contractor, the Project Labor Coordinator and/or the District. These rules will be published and posted. An employee's failure to satisfy his/her obligations under this section will subject him/her to discipline, up to and including discharge.

(c) The Parties agree that the Labor/Management Memorandum of Understanding (MOU) on Drug Abuse Prevention and Detection negotiated with the various General Contractor Associations and the Basic Trades' Unions (Titled Memorandum of Understanding Testing Policy for Drug Abuse; International Union of Operating Engineers Local Union No. 12; Revised June 2009 as shown in Exhibit __) shall be utilized under this Agreement.

Section 12.2 Inspection. The inspection of incoming shipments of equipment, machinery, and construction materials of every kind shall be performed at the discretion of the Contractor by individuals of its choice.

Section 12.3 Suspension of Work for Safety. A Contractor may suspend all or a portion of the job to protect the life and safety of employees. In such cases, employees will be compensated only for the actual time worked; provided, however, that where the Contractor requests employees to remain at the site and be available for work, the employees will be compensated for stand-by time at their basic hourly rate of pay.

Section 12.4 Water and Sanitary Facilities . The Contractor shall provide adequate supplies of drinking water and sanitary facilities for all employees as required by state law or regulation.

ARTICLE 13
TRAVEL AND SUBSISTENCE

Travel expenses, travel time, subsistence allowances, zone rates and parking reimbursements shall be paid in accordance with the applicable Schedule A Agreement unless superseded by the applicable prevailing wage determination.

ARTICLE 14
APPRENTICES

Section 14.1 Importance of Training. The Parties recognize the need to maintain continuing support of the programs designed to develop adequate numbers of competent workers in the construction industry, the obligation to capitalize on the availability of the local work force in the area served by the District, and the opportunities to provide continuing work under the construction program. To these ends, the Parties will facilitate, encourage, and assist local residents to commence and progress in Labor/Management Apprenticeship and/or training Programs in the construction industry leading to participation in such apprenticeship programs. The District, the Project Labor Coordinator, other District consultants, and the Council, will work cooperatively to identify, or establish and maintain, effective programs and procedures for persons interested in entering the construction industry and which will help prepare them for the formal joint labor/management apprenticeship programs maintained by the signatory Unions.

Section 14.2 Use of Apprentices.

(a) Apprentices used on Projects under this Agreement shall be registered in Joint Labor Management Apprenticeship Programs approved by the State of California. Apprentices may comprise up to thirty percent (30%) of each craft's work force at any time, unless the standards of the applicable joint apprenticeship committee confirmed by the Division of Apprenticeship Standards ("DAS"), establish a lower maximum percentage, and where such is the case, the applicable Union should use its best efforts with the Joint Labor Management apprenticeship committee and, if necessary, the DAS to permit up to thirty percent (30%) apprentices on the Project.

(b) The Unions agree to cooperate with the Contractor in furnishing apprentices as requested up to the maximum percentage. The apprentice ratio for each craft shall be in compliance, at a minimum, with the applicable provisions of the Labor Code relating to utilization of apprentices. The District shall encourage such utilization, and, both as to apprentices and the overall supply of experienced workers, the Project Labor Coordinator will work with the Council to assure appropriate and maximum utilization of apprentices and the continuing availability of both apprentices and journey persons.

(c) The Parties agree that apprentices will not be dispatched to Contractors working under this Agreement unless there is a journeymen working on the project where the apprentice is to be employed who is qualified to assist and oversee the apprentice's progress through the program in which he is participating.

(d) All apprentices shall work under the direct supervision of a journeyman from the trade in which the apprentice is indentured. A journeyman shall be defined as set forth in the California Code of Regulations, Title 8 [apprenticeship] section 205, which defines a

journeyman as a person who has either completed an accredited apprenticeship in his or her craft, or has completed the equivalent of an apprenticeship in length and content of work experience and all other requirements in the craft which has workers classified as journeyman in the apprenticeable occupation. Should a question arise as to a journeyman's qualification under this subsection, the Contractor shall provide adequate proof evidencing the worker's qualification as a journeyman to the Construction Manager and the Council.

Section 14.3 Joint Subcommittee on Training and Apprenticeship. To carry out the intent and purposes of this Article, a subcommittee of the Labor Management Committee established pursuant to Article 17 shall be established, jointly chaired by a designee of the District and a designee of the Council, to oversee the identification and/or effective development of procedures and programs leading to the full utilization of apprenticeship programs, and to work with representatives of each signatory craft's joint apprenticeship committee ("JAC") and representatives of the District's technical schools to establish appropriate criteria for recognition by such JAC's of the educational and work experience possessed by District students and graduates toward qualifying for entry or advanced level in the apprenticeship programs under the direction under such JAC's. The Subcommittee will meet as necessary at the call of the joint chairs to promptly facilitate its purposes in an expeditious manner as soon as this Agreement becomes effective. In addition to the joint chairs, the membership of the committee will consist of at least three representatives of the signatory local Unions and three representatives of Contractors signatory to this Agreement and experienced in overseeing and participating in joint labor management apprenticeship programs (or organizations to which the Contractors belong).

ARTICLE 15
WORKING CONDITIONS

Section 15.1 Meal and Rest Periods. There will be no non-working times established during working hours except as may be required by applicable state law or regulations. Meal periods and Rest periods shall be as provided for in Wage Order 16. Individual coffee containers will be permitted at the employees' work location; however, there will be no organized coffee breaks.

Section 15.2 Work Rules . The District, the Project Labor Coordinator, and/or relevant Contractor shall establish such reasonable work rules as they deem appropriate and not inconsistent with this Agreement. These rules will be posted at the work sites by the Contractor and may be amended thereafter as necessary. Failure to observe these rules and regulations by employees may be grounds for discipline up to an including discharge.

Section 15.3 Emergency Use of Tools and Equipment. There should be no restrictions on the emergency use of any tools by any qualified employee or supervisor, or on the use of any tools or equipment for the performance of work within the jurisdiction, provided the employee can safely use the tools and/or equipment involved and is compliance with applicable governmental rules and regulations.

Section 15.4 Access Restrictions for Cars . Recognizing the nature of the work being conducted on the site, employee access by a private automobile may be limited to certain roads and/or parking areas.

ARTICLE 16
PRE-JOB CONFERENCES

(a) Each Contractor will conduct a pre-job conference with the appropriate affected Union(s) prior to commencing work. The Council and the Project Labor Coordinator shall be notified in advance of all such conferences and may participate if they wish. All work assignments should be disclosed by the Contractor at the pre-job conference held in accordance with industry practice. Should there be any formal jurisdictional dispute raised under Article 8. the Project Labor Coordinator shall be promptly notified.

(b) If they have not already done so before the pre-job conference, each Contractor shall provide to the Unions, at the pre-job conference. a list of core employees which Contractor intends on using on this Project.

ARTICLE 17
LABOR/MANAGEMENT COOPERATION

Section 17.1 Joint Committee. The Parties to this Agreement shall establish a [six (6)] person Joint Administrative Committee (JAC). This JAC shall be comprised of [three (3)] representatives selected by the District and [three (3)] representatives selected by the Council to monitor compliance with the terms and conditions of this Agreement. Each representative shall designate an alternate who shall serve in his or her absence for any purpose contemplated by this Agreement.

Section 17.2 Functions of Joint Committee. The Committee shall meet on a schedule to be determined by the Committee or at the call of the joint chairs, to discuss the administration of the Agreement, the progress of the Projects. general labor management problems that may arise. and any other matters consistent with this Agreement. Substantive grievances or disputes arising under Articles 7. 8 or 10 shall not be reviewed or discussed by this Committee. but shall be processed pursuant to the provisions of the appropriate Article. The Project Labor Coordinator shall be responsible for the scheduling of the meetings. the preparation of the agenda topics for the meetings, with input from the Unions the Contractors and the District. Notice of the date. time and place of meetings. shall be given to the Committee members at least three (3) days prior to the meeting. If the Project Labor Coordinator is not a member of the District staff. the District must be notified of the meetings and invited to send a representative(s) to participate.

The Project Labor Coordinator shall be responsible for the scheduling of the meetings. the preparation of the agenda topics for the meetings, with input from the Unions. the Contractors, and the District. Notice of the date. time and place of meetings. shall be given to the Committee members at least three (3) days prior to the meeting.

Section 17.3 Subcommittees The Committee may form subcommittees to consider and advise the full Committee with regard to safety and health issues affecting the Project and other similar issues affecting the overall Project, including any workers compensation program initiated under this Agreement.

ARTICLE 18
SAVINGS AND SEPARABILITY

Section 18.1 Savings Clause. It is not the intention of the District, the Project Labor Coordinator, Contractor or the Union parties to violate any laws governing the subject manner of this Agreement. The Parties hereto agree that in the event any provision of this Agreement is finally held or determined to be illegal or void as being in contravention of any applicable law or regulation, the remainder of the Agreement shall remain in full force and effect unless the part or parts so found to be void are wholly inseparable from the remaining portions of this Agreement. Further, the Parties agree that if and when any provision(s) of this Agreement is finally held or determined to be illegal or void by a court of competent jurisdiction, the Parties will promptly enter into negotiations concerning the substantive effect of such decision for the purposes of achieving conformity with the requirements of any applicable laws and the intent of the Parties hereto. If the legality of this Agreement is challenged and any form of injunctive relief is granted by any court, suspending temporarily or permanently the implementation of this Agreement, then the Parties agree that all Project Work that would otherwise be covered by this Agreement should be continued to be bid and constructed without application of this Agreement so that there is no delay or interference with the ongoing planning, bidding and construction of any Project Work.

Section 18.2 Effect of Injunctions or Other Court Orders. The Parties recognize the right of the District to withdraw, at its absolute discretion, the utilization of the Agreement as part of any bid specification should a Court of competent jurisdiction issue any order, or any applicable statute which could result, temporarily or permanently in delay of the bidding, awarding and/or construction on the Project. Notwithstanding such an action by the District, or such court order or statutory provision, the Parties agree that the Agreement shall remain in full force and the fact on covered Project Work to the maximum extent legally possible.

ARTICLE 19
WAIVER

A waiver of or a failure to assert any provisions of this Agreement by any or all of the Parties hereto shall not constitute a waiver of such provision for the future. Any such waiver shall not constitute a modification of the Agreement or change in the terms and conditions of the Agreement and shall not relieve, excuse or release any of the Parties from any of their rights, duties or obligations hereunder.

ARTICLE 20
AMENDMENTS

The provisions of this Agreement can be renegotiated, supplemented, rescinded or otherwise altered only by mutual agreement in writing, hereafter signed by the negotiating Parties hereto.

ARTICLE 21
DURATION OF THE AGREEMENT

Section 21.1 Duration.

(a) This Agreement shall be effective from the date signed by all Parties and shall remain in effect for a period of three (3) years. Any covered Project awarded during the term of this Agreement shall continue to be covered hereunder, until completion of the Project, notwithstanding the expiration date of this Agreement.

(b) This Agreement may be extended by mutual consent of the District and the signatory Unions for such further periods as the Parties shall agree to.

Section 21.2 Turnover and Final Acceptance of Completed Work.

(a) Construction of any phase, portion, section, or segment of Project Work shall be deemed complete when such phase, portion, section or segment has been turned over to the District by the Contractor and the District has accepted such phase, portion, section, or segment. As areas and systems of the Project are inspected and construction-tested and/or approved and accepted by the District or third parties with the approval of the District, the Agreement shall have no further force or effect on such items or areas, except when the Contractor is directed by the District to engage and repairs or modifications required by its contract(s) with the District.

(b) Notice of each final acceptance received by the Contractor will be provided to the Council with the description of what portion, segment, etc. has been accepted. Final acceptance may be subject to a "punch" list, and in such case, the Agreement will continue to apply to each such item on the list until it is completed to the satisfaction of the District and Notice of Acceptance is given by the District or its representative to the Contractor. At the request of the Union, complete information describing any "punch" list work, as well as any additional work required of a Contractor at the direction of the District pursuant to (a) above, involving otherwise turned-over and completed facilities which have been accepted by the District, will be available from the Project Labor Coordinator.

IN WITNESS whereof the Parties have caused this Continuity of Work Agreement to be executed as of the date and year above stated.

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

By: _____
Cynthia Parulan- Colfer, Superintendent

LOS ANGELES/ORANGE COUNTIES BUILDING & CONSTRUCTION TRADES COUNCIL

By: _____
Ron Miller, Executive Secretary

Signatory Unions and Councils (see attached)

LOS ANGELES/ORANGE COUNTIES BUILDING AND CONSTRUCTION
TRADES COUNCIL CRAFT UNIONS AND DISTRICT COUNCILS

CEMENT MASONS L. 600
PLASTERERS LOCAL 200
HEAT & FROST INSULATORS LOCAL 5
SCDCL
IUEC LOCAL 18
Bricklayers #4
SHEET METAL 105
RCWA 36
Local 433
UA LOCAL 398
Ironworkers Local 416
Ironworkers Local 433
U.A. Local 250
PAT DC 36
T.I. MARBLE & TERRAZZO #18
IBEW #11
IRONWORKERS LOCAL # 416
TEAMSTERS Local 986
BOILERMAKERS #92
LABORERS LOCAL 300
SPRINKLER FITTERS UA 709
Granite workers Local 345
UA. Local 345

LOS ANGELES/ORANGE COUNTIES BUILDING AND CONSTRUCTION
TRADES COUNCIL CRAFT UNIONS AND DISTRICT COUNCILS

Plasterers #1414
Southwest Carpenters
IUOE #12
IUOE Local 12
IUOE Local 12

ATTACHMENT A – LETTER OF ASSENT
[To be signed by all contractors and subcontractors awarded work covered by the Continuity of Work Agreement prior to commencing work on any Project.]

[Contractor's Letterhead]

Project Labor Coordinator
c/o Hacienda La Puente Unified School District
15959 East Gale Avenue,
City Of Industry, California 91745
Attn: Mark Hansberger

Re: Letter of Assent - Continuity of Work Agreement for Certain Listed Projects

Dear Sir:

This is to confirm that [name of company] ("Company") agrees to be party to and bound by the Hacienda La Puente Unified School District Continuity of Work Agreement effective _____, 2013, as such Agreement may, from time to time, be amended by the negotiating parties or interpreted pursuant to its terms. Such obligation to be a party and bound by this Agreement shall extend to all work covered by the agreement undertaken by this Company on the project and this Company shall require all of its contractors and subcontractors of whatever tier to be similarly bound for all work within the scope of the Agreement by signing and furnishing to you an identical letter of assent prior to their commencement of work.

Sincerely,

[Name of Construction Company]

By: [_____] Name and Title of Authorized Executive

[Copies of this letter must be submitted to the District Coordinator and to the Council Consistent with Article II, Section 2.5(b).]

ATTACHMENT B
LIST OF PROJECTS

A. Energy Efficiency Projects being performed under the District's contract with Schneider Electric

ATTACHMENT C
CRAFT EMPLOYEE REQUEST FORM

See attached.

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT
CONTINUITY OF WORK AGREEMENT

CRAFT REQUEST FORM

CONTRACTOR USE ONLY **Contractor Information**

Requesting Contractor:

Phone: Fax:

Job Site Information

Project Name:

Address:

Job Superintendent:

Work Request Start Date and Time: Estimated Work Duration:

Contractor Requirements

Employee Classification					
Indicate Level	**Craft Position**	**Quantity**	**General Dispatch**	**Local Hire**	**Requested Skills, Experience, or Certifications and Equipment to Be Utilized**
Journeyman ☐					
Apprentice ☐					

UNION USE ONLY **Dispatch Information**

Name of Applicant(s) Dispatched:

Date of Dispatch:

UNION DISPATCHER: PLEASE CIRCLE THE ZIP CODE OF THE DISPATCHED WORKER(S)

Local Resident ZIP codes	91744	91745	91746	91748	91790	91792							
Second Tier ZIP codes	91733	91732	90601	90602	90605	90603	90631	92821	91765	91789	91791	91723	91722 91706

ATTACHMENT D
LIST OF NEUTRAL ARBITRATORS

The approved list of Permanent Neutral Arbitrators is as follows:

(1) Louis Zigman (Bar #48916);
473 South Holt Avenue
Los Angeles, CA 90048
Phone Number: (310) 556-3748

(2) Edna Francis
3865 Filion Street
Los Angeles, CA 90065
Phone Number: (323) 344-1026
Joseph Gentile (Bar#40180)

(3) Law Office of Joseph F Gentile PC
PO Box 7418
Thousand Oaks, California 91359-7418
Phone Number: (805) 499-4282

(4) Fredric Horowitz (Bar#66237);
P O Box 3613
Santa Monica, CA 90408-3613
Phone Number: (310) 829-6064

AMENDMENT NO. 1

TO THE

CONTINUITY OF WORK AGREEMENT

BY AND BETWEEN

THE HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

AND

LOS ANGELES/ORANGE COUNTIES BUILDING AND

CONSTRUCTION TRADES COUNCIL

AND THE SIGNATORY

LOCAL UNIONS AND DISTRICT COUNCILS

THIS AMENDMENT NO. 1 to the Continuity of Work Agreement ("**Amendment**") is entered into as of April 1st, 2019 and is by and between the Los Angeles/Orange Counties Building and Construction Trades Council and the signatory Local Unions and District Councils (collectively "**Unions**") and the Board of Education of the Hacienda La Puente Unified School District ("**District**") (collectively "**Parties**").

RECITALS:

A. In 2013, the Parties entered into that certain Continuity of Work Agreement ("**Existing CWA**").

B. The Existing CWA applies to the District's repair, upgrade, renovation, rehabilitation, improvement work and new construction projects awarded by District, as more particularly described in the Existing CWA.

C. The Parties desire to add to scope of the Existing CWA, and further desire to extend the term of the Existing CWA for an additional five (5) year period.

D. District and the Unions desire to amend the Existing PLA as set forth in this Amendment.

NOW, THEREFORE, it is mutually agreed by and between the Parties as follows:

AGREEMENT:

1. Section 1.1of the Existing CWA is hereby amended by deleting it in its entirety and replacing it with the following new Section 1.1 as follows:

   Background. The goal of the Board of Education is to continue to improve and rehabilitate the District's facilities so as to provide sufficient facilities and technologies to properly educate the children within the District's boundaries. The District's repair, upgrade, renovation, rehabilitation, improvement work and new construction work described in Section 2.2 of this Agreement are in furtherance of the District's goals and policies with respect to its facilities. The District, therefore, wishing to utilize the most modern, efficient and effective procedures for construction, including assurances of a sufficient supply of skilled craft persons, and the elimination of disruptions or interference with Project Work, adopts this Agreement in the best interests of the students, parents, District staff, and the taxpayers of the District to meet the District's goal that the Project Work be completed on time and within budget.

2. Section 1.2.6 of the Existing CWA is hereby amended by deleting it in its entirety and replacing it with the following new Section 1.2.6 as follows:

   "Project" or "Projects" or "Project Work" means the District's repair, renovation, rehabilitation, upgrade and improvement work described in Section 2.2 of this Agreement.

3. Section 2.2 of the Existing CWA is hereby amended by deleting it in its entirety and replacing it with the following new Section 2.2:

> Section 2.2 Specific The work covered by this Agreement is defined and limited to:
>
> (a) All repair, upgrade, renovation, rehabilitation, improvement work and new construction work for contracts that exceed $200,000.00; and
>
> (b) It is understood by the Parties that the District may at any time, and at its sole discretion, determine to build additional projects under this Agreement which are not currently proposed or do not meet the threshold requirement under subsection (a), above.

4. The first sentence of Section 21.1(a) of the Existing CWA is hereby amended by deleting it in its entirety and replacing it with the following new paragraph:

   This Agreement shall be effective from April 1, 2019 and shall remain in effect until April 1, 2024.

5. Attachment B of the existing PLA is hereby deleted.

6. Except as expressly amended by this Amendment, the Existing PLA remains in full force and effect as originally executed.

IN WITNESS WHEREOF, the parties have caused this Amendment to be duly executed and delivered as of the above date.

LOS ANGELES/ORANGE COUNTIES BUILDING AND CONSTRUCTION TRADES COUNCIL

Dated: 5-2-19

BY: _____

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT

Dated: 4/16/19

BY: _____

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The furnishing of all labor, materials, equipment, services, and incidentals necessary for Work for the construction of the new **TEMPLE ACADEMY PERFORMING ARTS CENTER in the city of La Puente, California**, as set forth in the Construction Documents which include, but are not limited to, the Drawings, Reports, Addenda, and Specifications.

1.02 RELATED REQUIREMENTS

A. Section 01 31 13: Project Coordination.
B. Section 01 32 13: Construction Schedule.
C. Section 01 45 23: Testing and Inspection.
D. Section 01 50 00: Construction Facilities and Temporary Controls.
E. Section 01 71 23: Field Engineering.

1.03 GENERAL DESCRIPTION OF WORK

A. The Project consist of the construction of a new Performing Arts Center Building including but not limited to utilities dry and wet, site work, finishes, landscape, and irrigation, etc. at Temple Academy. This description is a general description which may not include all the items which the bidder shall include in the proposal, refer to the drawings and project manual for entire scope of work.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 USE OF PREMISES

A. CONTRACTOR shall coordinate Work of all trades, Subcontractors, utility service providers, with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and/or Separate Work Contract. CONTRACTOR shall sequence, coordinate, and perform the Work to impose minimum hardship on the operation and use of the existing facilities and/or Project site. CONTRACTOR shall install all necessary protection for existing improvements, Project site, property, and new Work against dust, dirt, weather, damage, vandalism, and maintain and relocate all protection to accommodate progression of the Work.

B. CONTRACTOR shall confine entrance and exiting to the Project site and/or facilities to routes designated by the CONSTRUCTION MANAGER.

C. CONTRACTOR shall protect all surfaces, coverings, materials, and finished Work from damage. Mobile equipment shall be provided with pneumatic tires.

D. CONTRACTOR is advised HACIENDA LA PUENTE UNIFIED SCHOL DISTRICT may award Separate Work Contracts at this Project site.

E. CONTRACTOR shall not permit the use of portable and/or fixed radios or other types of sound producing devices including earphones and audio storage devices.

END OF SECTION

SECTION 01 12 16

PHASING OF THE WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements for phasing of the Work include logistics, phasing, and completion of designated phases prior to commencement of subsequent phases.

1.02 RELATED SECTIONS

A. Section 01 1100: Summary of the Work
B. Section 01 3113: Project Coordination
C. Section 01 3300: Submittal Procedures
D. Section 01 3213: Construction Schedule
E. Section 01 5000: Construction Facilities and Temporary Controls
F. Section 01 7700: Contract Closeout

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 SUBMITTALS

A. CONTRACTOR shall submit a Project site logistics plans in accordance with and as required by this Section.

3.02 LOGISTICS

A. Prior to commencement of the Work, CONTRACTOR shall prepare and submit to OAR a detailed Project site logistic plan, in the same size and scale of the Drawings, setting forth CONTRACTOR plan of the Work relative to the following but not limited to items:

1. In accordance with local ordinances a truck access route to and from the Project site.

2. The identification of any overhead wire restrictions for power, street lighting, signal and or cable.

3. Local sidewalk access and street closure requirements.

4. Protection of sidewalk pedestrians and vehicular traffic.

5. Project site fencing and access gate locations.

6. Construction parking.

7. Material staging and or delivery areas.

8. Material storage areas.

9. Temporary trailer locations.

10. Temporary service location and proposed routing of all temporary utilities.

11. Location of temporary and or accessible fire protection

12. Trash removal and location of dumpsters.

13. Location of portable sanitary facilities.

14. Stockpile and or lay down areas.

B. A revised Project site logistic plan may be required for separately identified phases of the Work as set forth below.

C. CONTRACTOR is responsible for securing and or obtaining all approvals of authorities having jurisdiction relative to logistic plan activities.

3.03 PHASING OF THE WORK

A. Project will be constructed in separate Milestone increments, as identified, or as described in this Section and the Contract Documents. Phasing will also delineate Work to be completed in each designated phase. Each phase will be required to be completed prior to the commencement of the next subsequent phase. CONTRACTOR shall incorporate and coordinate the Work of Separate Work Contracts relative to this Project.

B. CONTRACTOR shall install all necessary Work for, but not limited to, power, lighting, signal, HVAC, drainage, and plumbing systems in phased Work before completion of the designated phase. All valves, pull boxes, stub outs, temporary capping, and other Work necessary for phased completion and operation of all necessary systems shall be provided whether or not such Work is specifically identified in the Contract Documents.

3.04 PHASING OF THE WORK - GENERAL

A. CONTRACTOR shall prepare the Milestones Schedule in order to complete the Work and related activities in accordance with the Contract Documents. CONTRACTOR shall include all costs to complete all Work within the Milestones and/or Contract Time.

B. OWNER will be seriously damaged by not having all Work completed within the Milestones and/or Contract Time. It is mandatory the Work be complete within the Milestones and/or Contract Time.

3.05 PROJECT SCHEDULE – Contractor shall prepare a construction schedule in accordance with specification section 01 32 13.

END OF SECTION

SECTION 01 12 20

WORK RESTRICTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Contract General Conditions and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 CONTRACTOR'S USE OF PREMISES AND SITE, GENERAL

A. CONTRACTOR'S Use of Premises and Site:

1. CONTRACTOR shall always perform Work so as to impose no hardship on the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, nor cause unreasonable delays or hindrance thereto.

2. Demolition activities shall be scheduled to minimize disruption to the neighboring houses.

3. CONTRACTOR may not interrupt any utilities without prior written permission from the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

1.03 USE OF PREMISES

A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.

1. Limits: Confine operations to Project Area indicated on the Drawings. Use of other areas shall be only with the approval of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Confine demolitions operations to Perimeter of Work Area shown on the approved drawings.

2. There may be isolated items that are outside the limits indicated, such as irrigation line connections, site light pole relocations, plant or grading adjustments, utility extensions, and similar items. The scope of items beyond the general limit indicated have been specifically indicated and are to be performed within the scope of the Project.

1.04 CONTRACTOR'S USE OF PROJECT AREA

A. Location of Work: The Work shall be accomplished within areas indicated on Drawings as Project Area or, if not indicated, to areas as directed by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Use of other areas, including parking areas, shall be subject to approval by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Refer to Section 01 55 00 Access and Staging for additional requirements.

1. CONTRACTOR shall not unreasonably encumber the site with materials or equipment.

2. CONTRACTOR shall assume full responsibility for protection and safekeeping of products stored on the premises.

B. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT or CONTRACTORS performing work under separate contracts for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Temporary closures or restrictions of use of public thoroughfares, necessary to accomplish the Work, shall be made only as approved in advance by public safety and parking authorities having jurisdiction, as directed in writing by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

C. CONTRACTOR'S Use of the Project Area: Unless otherwise specified or indicated on the Drawings, during the demolition period the CONTRACTOR shall have full use of the designated Project Area for demolition operations, including use of the site. CONTRACTOR'S use of Project Area shall be limited only by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT right to perform demolition operations with its own forces or to employ separate CONTRACTORS on portions of the Project in accordance with the Contract General Conditions.

D. Protection of Existing Improvements and Facilities: CONTRACTOR shall protect property adjacent to the Project Area and all existing improvements and facilities within the Project Area, including paving and landscaping indicated to remain.

1. All existing improvements and facilities, except those specifically indicated for removal or demolition, shall be protected with temporary barriers, enclosures, and passageways. Refer to additional requirements specified in Section 01 56 00 - Temporary Barriers and Enclosures.

2. After completion of Work, existing improvements and facilities shall be restored to original condition and location. Project Area shall be cleaned and restored to acceptable condition, identical to or better than the condition prior to start of Work.

3. Should existing improvements and facilities be damaged or soiled beyond renovation or repair, new products shall be provided by CONTRACTOR equivalent to existing products, as directed by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

4. Project Area Access: Limit access to site to indicated routes and access points as indicated. If routes and access points are not indicated, access shall be as approved and as directed by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

5. Access to and egress from Project Area shall be in strict conformance to prearranged routes approved by Hacienda La Puente Unified School District, with the understanding that curtailment of demolition traffic or revision of access routes may be required on short notice if HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT operations mandate such changes because of excessive noise or problems of safety, service, or supply.

6. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to service and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

    a. Schedule deliveries to minimize use of driveways and entrances.

    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

E. Emergency Access: Provide pathways, drives, gates, directional signage, and other provisions as required by authorities having jurisdiction for emergency access to Project Area and adjoining campus facilities.

F. Emergency Egress: Maintain all pathways, drives, gates, and other means of egress during demolition as required by public safety authorities having jurisdiction.

1.05 WORK HOURS AND UTILITY RESTRICTIONS

A. CONTRACTOR'S Work Hours: Work hours shall be from 6:30 am to 4:30 pm Monday through Friday, any exceptions or changes must be requested in writing at least two working days in advance and approved by the Hacienda La Puente Unified School District on other days and at other hours shall be only with written approval of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

1. If it becomes necessary to perform Work on weekends and holidays, to meet milestone and final completion dates, Work shall be performed at no change in Contract Amount unless authorized by written Change Order or Field Instruction.

2. No grading on weekends or holidays unless approved in writing by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

B. Utility Outages and Shutdown: Schedule utility outages and shutdowns to be coordinated with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

1. Provide fourteen (14) calendar days written notice to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT of all utility outages and shutdowns. Describe Work to be performed, which utilities will be interrupted and time and duration of interruption.

2. CONTRACTOR shall provide temporary utilities to occupied facilities and adjacent properties when utilities to these facilities must be interrupted for more than two hours, unless otherwise directed by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

3. Any damage to the existing utility systems caused by the CONTRACTOR, shall be repaired by the CONTRACTOR immediately. If CONTRACTOR is unable to repair the damage in a timely manner, and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT personnel are available to fix the damage, the CONTRACTOR will be charged by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT based on the time and material spent to fix the damage. The CONTRACTOR shall be responsible for all consequences resulting from the damage.

4. Refer also to requirements for temporary utilities specified in Section 01 50 00, Construction Facilities and Temporary Controls.

1.06 NOISE AND VIBRATION RESTRICTIONS

A. Noise Restrictions: Demolition noise shall not exceed levels defined in local and state noise ordinances. Coordinate demolition activities that may exceed levels permitted in local and state ordinances with the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT before proceeding with the Work.

B. Vibration Restrictions: Do not perform activities that cause vibrations in adjacent occupied spaces, including spaces above and below location where Work is performed. If vibrations transmit through structure, perform Work at times when HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT activities are not being conducted.

1.07 HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S USE OF SITE AND PREMISES

A. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S Use of Site and Premises: HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT reserves the right to occupy and to place and install equipment in completed or partially completed areas of buildings and site. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. Partial HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT: HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT reserves the right to occupy and to place and install equipment in completed areas of building provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

2. Allow vendors and service providers access through site with reasonable notice.

1.08 EROSION CONTROL

A. Refer to Contract Documents for Erosion Control.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 15 30

CHANGE ORDER PROCEDURE

PART 1 - GENERAL

A. RELATED DOCUMENTS

1. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specifications Section, apply to this Section.

B. RELATED WORK

1. Section 00 70 00 General Conditions.
2. Section 00 08 00 Special Conditions.
3. Section 01 15 20 Applications for Payment.
4. Section 01 29 73 Schedule of Values.

C. WORK DESCRIPTION

1. **CONTRACTOR SHALL COMPLY WITH THE PROVISIONS IN THE GENERAL CONDITIONS AND THE SPECIAL CONDITIONS THAT RELATE TO CHANGES AND/OR REQUESTS FOR CHANGES (e.g., "Changes and Extra Work").**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 26 13

REQUESTS FOR CLARIFICATION (RFC) PROCEDURE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Construction Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Contract General Conditions and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Procedures for submitting requests for clarification (RFC).

B. Limitations on use of RFC to obtain clarification and clarification.

1.03 RELATED SECTIONS

A. Section 01 31 13 - Coordination: Requirements for organizing and coordinating the Work.

B. Section 01 33 00 - Submittals Procedures: Restriction on use of submittals for changes in materials, products, equipment, and systems.

C. Section 01 31 26 - Electronic Project Management System.

1.04 DEFINITIONS

A. Request for Clarification: A document submitted by the CONTRACTOR requesting clarification of a portion of the Contract Documents, hereinafter referred to as an RFC.

1.05 CONTRACTOR'S RFC

A. CONTRACTOR'S RFCs: Should CONTRACTOR be unable to determine from the Contract Documents the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of Work is described differently at more than one place in the Contract Documents; the CONTRACTOR shall request that the ARCHITECT/ENGINEER make a clarification of the requirements of the Contract Documents to resolve such matters. CONTRACTOR shall comply with procedures specified herein to make Requests for Clarification (RFCs).

B. Submission of RFCs: RFCs shall be prepared and submitted on a form provided in the Electronic Project Management system.

1. Requests for clarification not submitted by means of the EPM will not be reviewed or logged. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT or ARCHITECT/ENGINEER will only review requests for clarification or clarification received directly in the required written form submitted by means of the EPM system.

2. Forms if prepared by hand will not be reviewed.

3. Each RFC shall be given a discrete, consecutive number.

4. Each page of the RFC and each attachment to the RFC shall bear the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S project name, project number, date, RFC number and a descriptive title.

5. CONTRACTOR shall sign all RFCs attesting to good faith effort to determine from the Contract Documents the information requested for clarification. Frivolous RFCs shall be subject to reimbursement from CONTRACTOR to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT for fees charged by ARCHITECT, ARCHITECT'S consultants and other design professionals engaged by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

C. Subcontractor-Initiated and Supplier-Initiated RFCs: RFCs from Subcontractors and material suppliers shall be submitted through, be reviewed by, and be attached to an RFC prepared, signed, and submitted by CONTRACTOR. RFCs submitted directly by Subcontractors or material suppliers will be returned unanswered to the CONTRACTOR.

1. CONTRACTOR shall review all Subcontractors and supplier-initiated RFCs and take actions to resolve issues of coordination, sequencing, and layout of the Work.

2. RFCs submitted to request clarification of issues related to means, methods, techniques, and sequences of construction or for establishing trade jurisdictions and scopes of subcontracts will be returned without clarification. Such issues are solely the CONTRACTOR'S responsibility.

3. CONTRACTOR shall be responsible for delays resulting from the necessity to resubmit an RFC due to insufficient or incorrect information presented in the RFC.

D. Requested Information: Immediately on discovery of the need for additional clarification of the Contract Documents, CONTRACTOR shall prepare and submit an RFC in the form specified. CONTRACTOR shall carefully study the Contract Documents, to ensure that information sufficient for interpretation of requirements of the Contract Documents is not shown. RFCs that request interpretation of requirements clearly indicated in the Contract Documents will be returned without clarification.

1. In all cases in which RFCs are issued to request clarification of issues related to means, methods, techniques and sequences of construction, for example, pipe and duct routing, clearances, specific locations of Work shown diagrammatically, apparent interferences and similar items, the CONTRACTOR shall furnish all information required for the ARCHITECT or HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT to analyze and/or understand the circumstances causing the RFC and prepare a clarification or direction as to how the CONTRACTOR shall proceed.

2. If information included with this type of RFC by the CONTRACTOR is insufficient, the RFC will be returned unanswered.

E. Unacceptable Uses for RFCs: RFCs shall not be used to request the following:

1. Approval of submittals (use procedure specified in Section 01 33 00 - Submittals Procedures)

2. Approval of substitutions

3. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Contract General Conditions, as discussed in detail during pre-construction meeting)

4. Different methods of performing Work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Contract General Conditions).

F. Disputed Requirements: In the event the CONTRACTOR believes that a clarification by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Representative results in additional cost or time, CONTRACTOR shall comply with Article 5 of the Contract General Conditions.

G. RFC Log: A log for recording information about RFC status and responses will be provided in the EPM system. CONTRACTOR shall maintain and continuously update the RFC log in the EPM. Make corrections in the log as directed by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

H. Review Time: The amount of time necessary for and appropriate review and response to an RFC will vary. ARCHITECT will review each RFC, determine action required, and respond. Allow fourteen (14) Calendar days for ARCHITECT'S response for each RFC. RFCs received by ARCHITECT after 1:00 p.m. will be considered as received the following working day. CONTRACTOR will be notified in writing if responses will take more than fourteen (14) calendar days.

I. In the event the CONTRACTOR believes that a clarification by the ARCHITECT results in additional cost or time, CONTRACTOR shall not proceed with the Work indicated by the RFC until a Change Order (or Work Change Directive, if applicable to Project) is prepared and approved by the CENTRAL BASIN MUNICIPAL WATER or the CONTRACTOR is authorized in writing to proceed. RFCs shall not justify a cost increase in the Work or a change in the Project schedule.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 29 73

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Procedure for submission of a certified Schedule of Values for review and approval by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

1.02 RELATED REQUIREMENTS

A. Section 01 29 76: Progress Payment Procedures.
B. Section 01 31 13: Project Coordination.
C. Section 01 32 13: Construction Schedule.
D. Section 01 33 00: Submittal Procedures.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 PREPARATION

A. Upon receipt of the Notice of Intent to Award, CONTRACTOR shall commence preparation of a Schedule of Values in accordance with the form as described in this section.

B. CONTRACTOR shall coordinate the preparation of a Schedule of Values with preparation of the Construction Schedule as set forth in Section 01 32 13. The corresponding values from the specification division totals on cost loaded schedule shall match with the approved Schedule of Values.

C. Include the following Project identification on a certified Schedule of Values:

1. Project name and location.
2. Project Number.
3. Contract #.
4. CONTRACTOR name.
5. Date of Submittal.

D. The Schedule of Values shall be in tabular form with separate columns and shall include the following items:

1. Related Specification Section and Division.

2. Description of Work.

3. Name of Subcontractor, manufacturer, or supplier.

4. Dollar value, quantity, and unit of measure of each line item.

5. Percentage of Contract amount to nearest one-hundredth percent, adjusted to total 100 percent.

E. Round amounts to the nearest whole dollar; the total shall equal the Contract Amount.

F. Provide a breakdown of the Contract Amount in enough detail acceptable to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT to facilitate continued evaluation of Application for Payment and progress reports. Coordinate with the Project Manual table of content and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT approved Schedule of Values. Provide line items for subcontract amounts, where appropriate.

G. Provide separate line items for items in the Schedule of Values for total installed value of that part of the Work.

H. Provide separate line item for labor and material when required by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

I. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item except the amounts shown as separate line items.

J. Temporary facilities and other cost items that are not direct cost of actual work-in-place shall be shown as separate line items.

K. An approved certified Schedule of Values shall serve as the basis for the monthly certified Application for Payment.

L. If at any time, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT determines, in its reasonable discretion, that the schedule of Values does not approximate the actual cost being incurred by CONTRACTOR to perform the Work, CONTRACTOR shall prepare, for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT approval, a revised Schedule of Values, which then shall be used as the basis for future progress payments. Without changing the Contract Amount, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT reserves the right to require CONTRACTOR:

1. To increase or decrease amounts within the line items in the Schedule of Values; and,

2. To conform the price breakdown to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT accounting practice.

3.02 SUBMITTAL

A. CONTRACTOR shall submit (1) certified digital copies of a Schedule of Values for review and approval by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT at least fourteen (14) days before the first Application for Payment.

B. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will review and if necessary, return the submitted Schedule of Values with summary comments noting items not in compliance with the requirements of the Contract Documents. CONTRACTOR shall revise the submitted Schedule of Values and return revised file within three (3) days of receipt of summary comments.

C. Signature by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall constitute acceptance of the submitted Schedule of Values.

D. An approved copy of the Schedule of Values by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will be transmitted to CONTRACTOR and Inspector.

END OF SECTION

SECTION 01 29 76

PROGRESS PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. This Section specifies administrative and procedural requirements for a certified Application for Payment.

1. Coordinate the certified Schedule of Values and certified Application for Payment with, but not limited to, the Construction Schedule, submittal log, and list of Subcontractors.

1.02 RELATED REQUIREMENTS:

A. Section 01 29 73: Schedule of Values.
B. Section 01 32 13: Construction Schedule.
C. Section 01 77 00: Contract Closeout.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 APPLICATION FOR PAYMENT

A. Each certified Application for Payment shall be consistent with previous applications and payments as reviewed by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Representative, paid for by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, and:

1. The initial Application for Payment and Final Application for Payment at time of Completion involve additional requirements.

B. Payment Application Times: The period of Work covered by each Application for Payment is payment date for each progress payment as specified in the General Conditions. The period covered by each Application for Payment is previous month.

C. Payment Application Forms: Use AIA or HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT provided forms for the Application for Payment.

D. Application Preparation: Complete every entry on the form. Include execution by a person authorized to sign legal documents on behalf of CONTRACTOR. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will return incomplete applications without action.

E. Transmittal: Submit a minimum of three (3) signed and original copies of each certified Application for Payment to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. All copies shall be complete, including releases and similar attachments.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

F. Initial Application for Payment within sixty (60) days of issuance of Notice to Proceed: Administrative actions and submittals, that must precede or coincide with submittal for first certified Application for Payment include, but are not limited to, the following:

1. Certified Schedule of Values.

2. Performance and payment bonds.

3. List of principal suppliers and fabricators.

4. Worker Compensation certificates, if applicable.

5. Auto Insurance, if applicable.

6. Hazardous Material Insurance Certificates, if applicable.

7. Construction Schedule.

8. Submittal Schedule.

9. Emergency Contact List.

10. Copies of authorizations and licenses from governing authorities for performance of Work.

11. Certified Payroll (Submitted directly to Labor Compliance in electronic format as specified by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT including hard copy).

12. Storm Water Pollution Prevention Plan (SWPPP).

13. Certification of Compliance with CEQA Mitigations, if applicable.

14. Waiver Releases.

G. Applications for Payment: Administrative actions and submittals that must precede or coincide with submittal of Progress Applications for Payment include, but are not limited to, the following:

1. Certified Payroll (submitted directly to Labor Compliance in electronic format as specified by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT including hard copy).

2. Updated and current Project Record Drawings (as-built).

3. Monthly Construction Schedule (updated, submitted, and approved).

4. Approved Schedule of Values.

5. List of Subcontractors (Payments Summary).

6. Storm Water Pollution Prevention (SWPP) - Site Monitoring Report, if applicable.

7. Certification of Compliance with CEQA Mitigations, if applicable.

H. Final Application for Payment at Completion: Following HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT issuance of certificate of Completion, submit an Application for Payment:

1. Administrative actions, submittals and/or Work that shall precede or coincide with this application include:

    a. Approvals by authorities having legal jurisdiction over Work.

    b. Removal of temporary facilities and services.

    c. Removal of surplus materials, rubbish, and similar elements.

    d. HACIENDA LA PUENTE UNIFIED DISTRICT

    e. Final cleaning.

    f. Ensure that Work is completed.

    g. Advise on shifting insurance coverage.

    h. Certified Payroll (submitted directly to Labor Compliance in electronic format as specified by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT including hard copy).

    i. Certification that all benefit contributions due and owing to appropriate union trusts has been paid by CONTRACTOR and Subcontractors, as specified by the General Conditions.

    j. Storm Water Pollution Prevention - Site Monitoring Reports, SWPP revisions, compliance certifications, and Notice of Termination (NOT) (see Section 01 74 16).

    k. Waivers and releases for CONTRACTOR, SUBCONTRACTORS, and VENDORS.

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Administration of Contract: Provide administrative requirements for the proper coordination and completion of work including the following:

1. Supervisory personnel.
2. Preconstruction conference.
3. Project meetings, minimum of two (2) per month; prepare and distribute minutes.

B. Reports: Daily Logs to be submitted Monthly with progress schedule.

C. Work Schedule: Submit progress schedule, updated monthly.

D. Emergency Contacts: Submit and post a list of emergency telephone numbers and addresses for individuals to be contacted in case of emergency.

1.02 REQUIREMENTS

A. A close liaison will be maintained by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S Representative, HACIENDA LA PUENTE UNIFIED DISTRICT, and the CONTRACTOR. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S Representative(s) shall notify the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT immediately of any problems encountered, including but not limited to impacts to the cost, schedule and/or quality.

B. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S Representative(s) shall observe, inspect, and approve all Work and may reject unsuitable Work that does not conform to the Drawings and Specifications.

C. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S Representative(s) shall always have free access to the jobsite while Work is in progress, and the CONTRACTOR shall furnish information and assistance as necessary to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT’S Representative(s).

D. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S Representative(s) shall monitor demolition for conformance with the approved Drawings and Specifications.

E. The authority of the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S Representative(s) is limited to the following functions:

1. Observe and accept or reject work and materials including approval or disapproval of materials submittals.

2. Clarify Specifications and Drawings.

F. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S Representative(s) are not authorized to take the following actions, all of which remain the sole responsibility of the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT:

1. Make changes to the contract provisions, period of performance, or change any contract terms and conditions.

2. Make decisions concerning any claims and disputes.

1.03 SUBMITTALS

A. Types of Submittals: Provide types of submittals listed in individual sections and number of copies required below. Electronic copies may be substituted in lieu of all requirements. Refer to Specifications Section 01 33 00, Submittal Procedures.

1. Informational submittals, Site Logistics Plan, Work Plan, Health & Safety Plan, - three (3) copies.

2. Schedule Submittals - three (3) copies.

3. Inspection and test reports - three (3) copies.

4. Warranties - three (3) copies.

5. Survey data - three (3) copies.

6. Closeout submittals - three (3) copies.

B. Submittal Procedures: Comply with project format for submittals. Comply with submittal procedures established by ENGINEER'S including ENGINEER'S submittal and shop drawing stamp. Provide required resubmittals if original submittals are not approved. Provide distribution of approved copies including modifications after submittals have been approved.

C. Samples and Shop Drawings: Samples and shop drawings shall be prepared specifically for this project. Shop drawings shall include dimensions and details, including adjacent construction and related work. Note special coordination required. Note any deviations from requirements of the Contract Documents.

D. Warranties: Provide warranties as specified; warranties shall not limit length of time for remedy of damages OWNER may have by legal statute. CONTRACTOR, supplier, or installer responsible for performance of warranty shall sign warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 10

COMMUNICATION

PART 1 - GENERAL

1.01 GENERAL COMMUNICATION

A. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall designate a Representative for this project.

B. All oral communication and correspondence shall be between CONTRACTOR, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Representative, and ARCHITECT'S Representative. The ARCHITECT'S Representative shall not provide oral direction to the CONTRACTOR Representative. All direction to the CONTRACTOR shall be through written Requests for Information, or other contractually permitted documentation.

C. The ARCHITECT'S Representative will communicate and transmit information to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S representative as requested by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

D. Subcontractors: Do not contact members of the design team directly. Transmit problems or questions in writing using the Request for Clarification form (RFC) through CONTRACTOR.

E. In case of an EMERGENCY contact the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Representative and ARCHITECT immediately.

1.02 CORRESPONDENCE

A. Address all written correspondence to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and ARCHITECT.

B. Format: Number correspondence sequentially beginning with Serial Letter #001. Include project title and ARCHITECT'S project number.

1.03 REQUEST FOR CLARIFICATION (RFC)

A. When field conditions or Contract Document contents require clarification or verification by the ARCHITECT or ARCHITECT'S consultants, a written RFC is to be submitted per the following:

1. Identify the nature and location of each clarification/verification using the RFC form; provide as a minimum the following information:

a. Project name and number.
b. Date.
c. Date response required by.
d. RFC number.
e. Subject.
f. Initiator of the question.
g. Indication of costs and/or schedule impact, if known.
h. Location on site.
i. Contract drawing reference.
j. Contract specification section and paragraph reference.
k. Descriptive text.
l. Space for reply on same page as questions; and

m. Single subject matter, one (1) item each - architectural, civil, structural, mechanical, electrical.

2. Number each RFC sequentially beginning with #001. Only one (1) questions per RFC. Do not attach cover sheets.

B. Route: RFCs in same manner as correspondence.

C. Copy: RFCs in same manner as correspondence.

D. Clarifications: Incorporate the essence of all oral discussions onto an RFC form or receive ASI from ARCHITECT.

E. Procedure: If, after an oral discussion or directive, the CONTRACTOR fails to correct work that in the opinion of the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT fails to conform to the Contract Documents, a Nonconformance Report shall be issued. Upon receipt of NCR, CONTRACTOR shall take immediate action to correct work. Review corrections at progress meetings for non-conforming work.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

SECTION 01 31 13

PROJECT COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements necessary for coordinating Work operations including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.

1.02. RELATED REQUIREMENTS

A. Section 01 32 13: Construction Schedule.
B. Section 01 33 00: Submittal Procedures.
C. Section 01 77 00: Contract Closeout.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 COORDINATION

A. CONTRACTOR shall coordinate operations included in various sections of Contract Documents, including but not limited to:

1. Schedule operations in sequence required where construction of one part of Work depends on construction of other components.

2. Prepare and administer provisions for coordination drawings.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of Work. Such administrative activities include, but are not limited to, following:

1. Preparation of schedules.
2. Installation, relocation, and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project closeout activities.

C. Conservation: Coordinate Work operations to assure operations are carried out with consideration given to conservation of energy, water, materials, and:

1. Salvage materials and equipment involved in performance of, but not actually incorporated into Work.

3.02 SUBMITTALS

A. Coordination Drawings: CONTRACTOR shall notify the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, and ARCHITECT of all major conflicts in writing in a timely manner so that the design team can respond without delays.

1. Inconsistencies between drawings, specifications, and codes.

B. CONTRACTOR will be responsible for the overall coordination review. As each coordination drawing is completed, CONTRACTOR will meet with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT to review and resolve all conflicts on coordination drawings.

1. Coordination meetings will be held in Project field office of CONTRACTOR. Reviewed coordination drawings will be maintained in Project field office of CONTRACTOR. Meeting minutes shall be developed by CONTRACTOR and submitted to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT within five (5) days.

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements for Project meetings, including but not limited to, the following:

1. Job start meeting.
2. Pre-installation conferences.
3. Progress meetings.
4. Meetings as required by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

1.02 RELATED REQUIREMENTS

A. Section 01 31 13: Project Coordination.
B. Section 01 32 13: Construction Schedule.
C. Section 01 33 00: Submittal Procedures.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 JOB START MEETING

A. In accordance with General Conditions, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will schedule a job start meeting before starting the Work, at a time and date determined by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Meeting shall be held at the Project site, or another location as determined by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Meeting will be held in order to review responsibilities, procedures, and other administrative requirements contained within the Contract Documents.

B. Authorized representatives of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, ARCHITECT, CONTRACTOR, and other parties shall attend the meeting. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda items shall include significant items which could affect progress of the Work, including, but not limited to the following:

1. Preliminary Schedule.

2. Critical work sequencing.

3. Designation of responsible personnel.

4. Lines of Communication

5. Procedures for processing field decisions.

6. Request for Proposal.

7. Request for Clarification.

8. Construction Directive and Change Order.

9. Procedures for processing Applications for Payment.

10. Prevailing wages.

11. Preparation of project record documents.

12. Use of the Project site and/or premises.

13. Procedures for disruption and shutdown

14. Parking availability.

15. Office, work, and storage areas.

16. Equipment deliveries and priorities.

17. Safety procedures.

18. First Aid.

19. Security.

20. Housekeeping. Progress cleaning

21. Working hours and work restrictions

22. Contract Compliance Officer.

23. Insurance Services.

24. Environmental Health and Safety.

25. Owner's occupancy requirements

26. Substantial Completion, Administrative Closeout and Contract Completion requirements and procedures.

27. Procedures for Mandatory Dispute and Claim Resolution.

28. Storm Water Pollution Prevention Plan (SWPPP).

29. CEQA Compliance, if applicable.

D. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall prepare and issue meeting minutes to attendees and interested parties no later than five (5) calendar days after the meeting date.

3.02 PROGRESS MEETINGS

A. Progress meetings will be held at the Project site at regular intervals, typically weekly, as determined by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

B. In addition to representatives of CONTRACTOR, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, and ARCHITECT, each Subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of the Work shall, if requested by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude all matters relating to the Work.

C. Failure of CONTRACTOR to be so represented at any progress meeting which is held at a mutually agreed time or for which a written notice is given, shall not relieve CONTRACTOR from abiding by any and all HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT determinations or directives issued at such meeting.

D. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will review and correct or approve minutes of the previous progress meeting and will review other significant items affecting progress. Topics for discussion as appropriate to the status of the Project include but are not limited to:

1. Interface requirements.

2. Schedule (review of CONTRACTOR'S three-week Look-Ahead and Monthly Schedules).

3. Sequence and coordination.

4. Status of submittals / RFCs.

5. Deliveries.

6. Access.

7. Site utilization.

8. Temporary Facilities and Controls.

9. Hours of work.

10. Hazards and risks.

11. Housekeeping.

12. Unforeseen conditions.

13. Defective Work.

14. Construction Directive.

15. Request for Proposal.

16. Change Order Proposals and Change Orders.

17. Documentation of information for payment requests.

18. Application for Payment.

19. Other items as required or as brought forth.

20. Initial Notice of Start of Issue, Event, Condition, Circumstance, or Cause of Perceived Delay, Disruption, Interference, Hindrance, Acceleration as described in the General Conditions).

21. Final Notice of End of Issue, Event, Condition, Circumstance, or Cause of Perceived Delay, Disruption, Interference, Hindrance, Acceleration as described in the General Conditions).

22. Storm Water Pollution Prevention.

23. CEQA Compliance, if applicable.

E. No later than three (3) calendar days after each progress meeting, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will prepare and distribute minutes of the meeting to each present and absent party. Include a summary, in narrative form, of progress, decisions, directives, actions taken, and all other issues since the previous meeting and report.

1. Schedule Updating: CONTRACTOR shall revise the Schedule after each progress meeting where revisions to the schedule have been made or recognized and issue the revised schedule at the next scheduled progress meeting.

3.03 ADDITIONAL MEETINGS

A. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, upon giving notice to the intended parties and without further obligation, may require additional meetings to discuss Work and/or Project related activities.

3.04 HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S RIGHT TO RECORD

A. CONTRACTOR agrees on behalf of itself and all its subcontractors that the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT may audiotape or videotape any meetings, training, and any work at any time during the Project.

END OF SECTION

SECTION 01 31 26

ELECTRONIC PROJECT MANAGEMENT SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section is in addition to the Contract General Conditions.

B. The CONTRACTOR is required to use an Electronic Project Management (EPM) system for electronic construction management document control and communications between the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, other project-related consultants, and the CONTRACTOR (aka the Project Team).

C. Unless otherwise designated by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, the system will be maintained and owned by the CONTRACTOR but operated collaboratively by the Project Team. CONTRACTOR is required to get HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT approval on the type of EPM system program that will be used on this project. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT preferred EPM is Procore construction management software or equal. The EPM that the CONTRACTOR chooses shall be approved by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and shall be capable of providing unlimited user access, similar to what Procore provides, for the entire Project Team. The CONTRACTOR shall be responsible for training the members of the Project team on how to use the EPM at no additional cost to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

D. The CONTRACTOR shall be primarily responsible for the scanning, uploading, and logging of all electronic documents for the project as indicated below.

E. The CONTRACTOR shall provide personnel and equipment as required by their employees to electronically submit all necessary documents.

F. The EPM system shall contain the following information which shall be made available by the CONTRACTOR for the project team:

1. Requests for Clarification and Logs

2. Inspection Requests / Reports

3. Non-Compliance Inspection Reports

4. Project Photographs

5. Project Meeting Minutes

6. Project FTP Site

7. Contract Documents (including specifications, drawings, reference materials, sketches, ASIs, etc.)

8. Other Documentation as determined by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and the Project team.

G. All Request for Clarification (RFCs) and Inspection Requests shall be submitted by the CONTRACTOR to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT electronically through the EPM.

H. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will NOT accept faxed and/or handwritten documentation of RFCs, RFC Sketches, and/or Inspection Requests.

1. The CONTRACTOR shall be solely responsible for data entry via the chosen EPM Website for the generation of RFIs.

2. The CONTRACTOR shall be solely responsible for the scanning of sketches / drawings as necessary for the electronic submittal and attachment of necessary information related to RFIs.

3. CONTRACTOR shall supply field personnel all necessary computer equipment necessary to enter RFIs and other documentation electronically.

I. Submittals shall be submitted via Section 01 33 00 Submittal Procedures.

1.02 CONTRACTOR'S RESPONSIBILITIES

A. The CONTRACTOR shall have computer(s) with capabilities to access the EPM system at their on-site and off-site project offices. At the pre-construction meeting, the CONTRACTOR shall provide to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT the contact information (including email addresses) of all CONTRACTOR personnel that the CONTRACTOR chooses to provide coordination for the EPM system and information. At a minimum, this will include the CONTRACTOR'S Project Engineer and/or other technical staff as required. These personnel shall have the computer skills required to access the Internet and do basic trouble shooting of the EPM system. The CONTRACTOR shall provide training and technical support to the Project team personnel for use of the EPM system. The CONTRACTOR shall complete four (4) hours training, minimum, for each Project team personnel member who will access and use the EPM. The EPM shall be onsite and operational to process the CONTRACTOR'S first payment request.

1.03 OFFICIAL RECORDS

A. The documentation and records maintained on the EPM system will be the "Official Record" for the project (not including as-builts created by the ARCHITECT). At the conclusion of the project all records shall be made available via Adobe "pdf" and/or other electronic filing methods approved by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT for import/export.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 13

CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Required procedures, preparation, submittals, reviews, updates, and revisions to the cost/schedule integrated demolition schedule. The purpose of this section is to:

1. Ensure adequate planning and execution of the Work by CONTRACTOR.

2. Establish a standard against which satisfactory completion of the Project can be measured by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

3. Assist CONTRACTOR and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Construction Manager in monitoring progress.

4. Aid in assessing the impact of any changes to the Contract.

5. Provide justification for progress payments.

1.02 RELATED REQUIREMENTS

A. Section 01 11 00 Summary of Work.
B. Section 01 29 73 Schedule of Values.
C. Section 01 29 76 Progress Payment Procedures.
D. Section 01 31 13 Project Coordination.
E. Section 01 33 00 Submittal Procedures.
F. Section 01 50 00 Construction Facilities Temporary Controls.
G. Section 01 77 00 Contract Closeout.

PART 2 - PRODUCTS

2.01 SCHEDULING SOFTWARE

A. CONTRACTOR shall utilize Primavera Scheduling Software (P6) to employ the Critical Path Method (CPM) in the development and maintenance of the demolition schedule. If the version of Primavera Scheduling Software (P6) used is greater than Version 15.1, the CONTRACTOR shall save & export schedules in Version 15.1 before submitting to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT for review. The scheduling software shall be capable of being resource loaded with manpower, costs, and materials. It shall also be capable of generating time-scaled logic diagrams, resource histograms and profiles, bar charts, layouts, and reports with any and/or all activity detail.

B. All schedule calculation rules, auto cost rules and resource calculation rules shall be in a format acceptable to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. When schedule calculations are performed, the “Retained Logic” setting shall be used. CONTRACTOR shall use the zero “Decimal Places” setting.

PART 3 - EXECUTION

3.01 SUBMITTALS

A. CONTRACTOR shall retain a construction scheduler to work in enough capacity to perform all of the requirements outlined in this Section. CONTRACTOR shall submit to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT a resume of the proposed Scheduler for review and acceptance prior to the preparation of any Schedule. The resume shall demonstrate the proposed scheduler's capability to plan, coordinate, execute, and monitor a cost/resource loaded CPM schedule as required for this Project and have a minimum of five years direct experience using Primavera Project Planner. Scheduler will cooperate with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and shall be available on site for monitoring, maintaining, and updating schedules in a timely manner. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT has the right to reject the Scheduler based upon a lack of experience as required by this Section or based on lack of on-site performance and timeliness of schedule submittals. If HACIENDA LA PUENTE UNIFIED SDCHOOL DISTRICT does not accept the proposed Scheduler, CONTRACTOR shall within one week of disapproval, propose another scheduler who meets the experience requirements stated above.

B. CONTRACTOR shall electronically deliver the schedule file in its original format at the time of submittal.

C. CONTRACTOR shall attend a pre-construction scheduling conference with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT within seven (7) days after Notice of Award. CONTRACTOR shall then develop and submit the Preliminary Schedule within fourteen (14) days after Notice of Award.

D. CONTRACTOR shall submit the Proposed Baseline Schedule no later than thirty (30) days from the Notice to Proceed.

E. CONTRACTOR shall submit the Monthly Schedule Updates, Four-Week Rolling Schedules, and Recovery Schedules as required.

3.02 PRELIMINARY SCHEDULE

A. The purpose of the cost-loaded Preliminary Schedule is to provide an interim mechanism in which to measure performance on individual activities and to validate the CONTRACTOR'S monthly Application for Payment on work performed (starting with month one) during the first three (3) months of the job until the complete Baseline Schedule is approved by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

B. CONTRACTOR shall develop and submit a cost loaded Preliminary Schedule as required by this Section. It shall be submitted in computer generated network format and shall be organized by Activity Codes representing the CONTRACTOR'S intended sequencing of the Work. The Preliminary Construction Schedule shall include activities for the first thirty (30) calendar days following the NTP such as mobilization, specified review periods, milestones, and detailed demolition activities.

C. Upon HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S acceptance of the Preliminary Schedule, CONTRACTOR shall update the accepted Preliminary Schedule each month (beginning with month 1 and submit these updates until CONTRACTOR'S Baseline Schedule is fully developed and accepted. Since updates to Preliminary Demolition Schedule are the basis for payment to CONTRACTOR during the first month period, submittal and acceptance of such updates shall be a condition precedent to approving monthly payment(s), as referenced in General Conditions.

D. Provide a written narrative describing CONTRACTOR'S approach to mobilization, procurement, and demolition during the first thirty (30) calendar days including crew sizes, equipment and material delivery, site access, submittals, and permits.

E. Submit Bar Charts, Tabular Reports, a Cost Flow Histogram, Electronic Data, and Plots in accordance with the General Conditions.

F. If the project is of a short duration and it would be more beneficial for the CONTRACTOR to forego the preliminary 90-day schedule, then upon CONTRACTOR request and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT written approval; the CONTRACTOR may proceed with the development of the Baseline Schedule for the entire project duration. This will need to be implemented expeditiously to not impede the processing of the monthly pay applications. Approval of the Baseline schedule and first monthly update is condition precedent of the monthly pay application.

3.03 SCHEDULE OF VALUES

A. CONTRACTOR shall cost load activities in the Baseline Schedule and allocate costs to the cost accounts of all activities. The cost accounts shall match the CSI sections listed in the Table of Contents of the Specifications. The format shall be coordinated with Specification Section 01 29 73 (Schedule of Values), and Specification Section 01 29 76 (Progress Payment Procedures).

B. Submit a computer-generated report from the Baseline Schedule using the P6 scheduling software. The report shall contain the following data for each activity: Cost Account Number (by CSI section), Cost Account Description, Cost Account Budget, Cost to Date, Cost this Period, and Cost to complete. Total costs shall be organized and totaled by CSI section. This report shall be the source of the data CONTRACTOR reports on the Schedule of Values.

C. The cost loading associated with the activities shall be based on CONTRACTOR estimates of costs that CONTRACTOR will incur performing the specific activities. If HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT determines that the costs are front loaded and/or the distribution of costs is unreasonable, CONTRACTOR shall revise accordingly and resubmit the Schedule of Values within five (5) days for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT review.

3.04 BASELINE SCHEDULE CPM NETWORK

A. No later than twenty (20) days from the Notice to Proceed, CONTRACTOR shall submit a detailed Proposed Baseline Schedule that covers the entire duration of the Project. This schedule shall convey CONTRACTOR'S plan for organizing, managing, and executing the Work.

B. The Proposed Baseline Schedule shall include activity descriptions, sequencing, logic relationships, duration estimates, cost loading by CSI section in accordance with General Conditions, resource loading of manpower, and other information as set forth in this Section.

1. The Proposed Baseline Schedule shall include all Milestones as well as all activities required to achieve timely completion of the Milestones.

2. The Proposed Baseline Schedule shall include activities for: all activities, the NTP, Milestones, submittals, coordination drawings, re-submittals, procurement of materials and equipment, manufacturing and delivery, access restrictions, work restrictions, and contract closeout activities.

3. The Proposed Baseline Schedule shall allow for all foreseeable factors and risks which affect performance of the Work. Include allowances for weather conditions in accordance with General Conditions, applicable laws, transportation, traffic, air quality, noise, or any other applicable regulatory requirements, regulations, or collective bargaining agreements pertaining to labor.

4. CONTRACTOR shall not use any float suppression techniques such as preferential sequencing or logic, special hidden lag time between activities or milestones, float absorption activities, or unjustifiable over-estimating of activity durations in preparing the Proposed Baseline Schedule. Finish Milestones should be constrained to a “Finish on or before” constraint. No “Zero Free Float” constraints, No “Early” Constraints, and No “Mandatory Finish” constraints shall be utilized.

5. The Proposed Baseline Schedule shall include activity durations based on the crew sizes and equipment utilization that CONTRACTOR will maintain during the Project. No activity durations shall exceed fifteen (15) working days unless approved by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Non-demolition activities such as procurement, delivery, or submittal activities are exempted. CONTRACTOR will need to perform their due-diligence to make sure that the activity man-power loading and activity durations are directly integrated.

6. CONTRACTOR shall include with the Proposed Baseline Schedule a written narrative report sufficiently comprehensive to explain the rationale behind CONTRACTOR’S approach to the Work including but not limited to: activity durations, manpower flow, average crew sizes (by trade), equipment requirements, anticipated production rates, constraints, holidays and other non-work days, potential problem areas, permits, coordination with regulatory authorities, utilities, separate work contracts and other parties, and long lead delivery items requiring more than thirty (30) days from the date of order to delivery to the Project site.

C. At the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT’S request, furnish a detailed written explanation of CONTRACTOR’S basis for specific durations, logic, phasing, or other information. Such an explanation shall include CONTRACTOR’S rationale for selecting the number of crews, crew composition, number of shifts per day, number of hours in a shift, number of workdays per week, construction equipment, and similar factors.

D. The Proposed Baseline Schedule activities shall contain the following data:

1. Activity ID numbers shall consist of a built-in intelligence scheme. Following HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT acceptance of the Baseline Schedule, Activity ID numbers shall not be changed.

2. Activity Descriptions shall provide adequate information that readily identifies each activity, work scope, and location.

3. At a minimum, activity codes specified in the General Conditions shall be applied to each activity. This is at the activity level and is different than WBS coding structure.

4. Cost accounts (in CSI Master Format) and Resource accounts shall be applied to each activity. They shall include lump sum costs, and man-hours/man-days (where applicable).

E. At HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT’S request, furnish a written explanation for each lead or lag relationship and each constrained date. Unjustifiable leads, lags, and constraints will result in HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT’S rejection of the Proposed Baseline Schedule.

F. Calendar Identification: In the scheduling software, identify all activities that will require overtime shifts, double shifts, and work on weekends or holidays. Identify non-workdays and holidays in the schedule calendar. All milestones stipulated in the special provisions, shall be placed on a calendar with seven (7) days per week. No holiday or non-work-day restrictions are permitted on this calendar. Within the schedule software, the CONTRACTOR shall not use Primavera Global Calendars from past projects, but rather

shall use project specific calendars created for this specific contract. The Calendar coding shall be transferable and compatible with the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT calendars as to not distort any start/finish dates and “total float” values upon schedule re-calculation.

G. Activity Codes: As a minimum, the Activity Codes shown in the Table 1 below shall be assigned to each activity.

Table 1

Name	Length	Description
TYPE	2	Type of activity (for example: mobilization, submittals, demolition, milestones, etcetera.)
AREA	2	Area or Building
STAG	2	Stage (for example: Foundations, Superstructure, Exterior, Interior, Roof, Floor Number etcetera.)
SBST	2	Substage (a specific area within a stage such as: main electrical room, kitchen, room number, etcetera.)
RESP	7	Responsible Party (subcontractor and/or trade)
DIV	2	CSI: Division
SPEC	5	CSI Specification Section number

1. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT may require additional coding of activities. The mandatory activity code requirements listed in Table 1 are not to be construed as setting limits on CONTRACTOR’S management and coordination responsibilities but are intended to guide CONTRACTOR in the administration of its contractual responsibilities.

H. Milestones: are designated dates in which Work or portions thereof are required to start and complete in accordance with the Contract Documents.

1. Where the term completion or similar terms are used in regard to a Milestone, it shall be construed to mean all portions of the Work in the indicated phase, area, and zone are complete and acceptable to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Where the term starts or similar terms are used in the designation of a Milestone, it shall be construed to mean a portion of the Work in the indicated phase, area, or zone is required to be commenced.

2. A Proposed Baseline Schedule extending beyond the Milestones or Contract Time will not be acceptable.

3. Finish Milestones shall be constrained with “Finish on or before” type constraints in.

4. In the P6 scheduling software, prior to opening the project, click the “dates” tab and place a “must finish by” date to match the Contract Completion Milestone date.

5. A Proposed Baseline Schedule indicating Work completed in less time than the Milestones and/or Contract Time will not be acceptable. Rather, CONTRACTOR shall show any unused contract time as float available to the project.

6. Milestones shall be placed on a calendar with seven (7) days per week. No Holiday or non-work-day restrictions are permitted on this calendar.

I. The Critical Path shall be clearly indicated on all schedules submitted. An activity is defined as critical when it is shown to be on the longest path from beginning to end.

J. CONTRACTOR shall allow for inclement weather in the Proposed Baseline Schedule by incorporating an activity titled "Rain Day Impact Allowance" as the last activity prior to the Completion Milestone. No other activities may be concurrent with it. The duration of the Rain Day Impact Allowance activity will be based on Table #2 below and will be calculated from the Notice to Proceed until the original date of Completion.

Table 2: Cumulative Calendar Days "Rain Day Impact Allowance":

January	6	July	0
February	5	August	0
March	5	September	1
April	4	October	1
May	1	November	3
June	0	December	5

1. When inclement weather at the Project site impacts Critical Path activities, CONTRACTOR may provide the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT with a written request for a weather impact day describing the inclement weather delay on the Critical Path activities. The inclement weather delay must be clearly indicated by a 70 percent decrease in the field labor workforce hours on Critical Path activities on the day in question as indicated by CONTRACTOR'S Daily reports from the day in question and the scheduled workdays prior to the day in question. Upon HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S independent confirmation of the amount of rainfall and impact, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will authorize CONTRACTOR to reduce the duration of the Rain Day Impact Allowance by one (1) day.

2. Inclement weather on non-scheduled workdays shall not be granted as weather impact days. If CONTRACTOR asks to work a specific weekend or holiday and gives HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT advanced, written notification of critical path work to be performed and a substantial amount of precipitation occurs that prevents the work from being performed, then that day can be claimed as a weather impact day. If the effects of inclement weather from a non-scheduled workday carry forward to a scheduled workday and impacts the Critical Path as noted above, then the scheduled workday will be considered impacted by weather. Any unused rain day allowance at the end of the project will be shown as available float to the Completion Milestone. Excusable, non-compensable time extensions will be granted for inclement weather to Completion milestone only after the weather impact area affecting the critical path work has exhausted the allotted cumulative Rain Day Impact Allowance. On projects that have multiple phases with defined start and finish dates, the cumulative rain impact allowance may be split up (pro-rated) into their designated phases upon HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Approval.

K. Cost loaded Activities:

1. Each activity included in the Proposed Baseline Schedule shall be assigned the cost CONTRACTOR estimates it will incur performing that activity. Each activity's assigned cost will be inclusive of overhead and profit so CONTRACTOR'S total overhead and profit is distributed over all activities on a pro rata basis. The sum of the costs assigned to activities shall equal the total contract value. No activity costs shall be assigned to manufacturing or delivery activities unless approved by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. If HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT finds that the costs are front loaded and the distribution of costs is unreasonable, CONTRACTOR shall re-distribute the costs and resubmit the revised Schedule of Values within five (5) days for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT backcheck.

2. CONTRACTOR shall cost load activities in the Proposed Baseline Schedule and allocate costs to related resource/cost accounts associated with each activity. The cost accounts shall match the CSI sections listed in the Table of Contents of the Specifications. All cost-loaded activities shall roll-up to their designated CSI sections and shall be the basis for the data reported in the Schedule of Values (Section 01 29 73), and Progress Payment Procedures (Section 01 29 76).

3. Submit computer generated reports using the scheduling software which will be the basis for the approved Schedule of Values. The reports shall contain the following data for each activity: Cost/Resource Account Number (by CSI section), Cost/Resource Account Description, Cost/Resource Account Budget, Cost to Date, Cost this Period, and Cost at Completion. Total Costs shall be organized and totaled by CSI section.

4. Submit a Cost Flow Histogram in accordance with General Conditions.

L. CONTRACTOR shall submit computer generated reports and plots with the Proposed Baseline Schedule submittal package. Format shall display the following columns: Activity ID, Activity Description, Original Duration, Remaining Duration, Percent Complete, Early Start, Early Finish, Late Start, Late Finish, and Total Float. Unless otherwise noted, bar charts and reports shall be on 8 ½ by 11 paper and bound.

1. Color Bar charts shall be generated separately for:

   a. Milestones only.

   b. All Activities sorted by Early Start date and organized by Project, Area, Stage, and Substage. (The network shall be organized to show continuous flow of all activities from left to right). CONTRACTOR is reminded that during the monthly schedule update process, even the activities that have already been completed need to be shown in this “all activities” bar chart report.

   c. Activities sorted by Responsibility.

   d. Summary level of all activities sorted by craft/trade and area.

   e. Critical Path (Longest Path). The network shall be organized to show continuous flow of all critical activities on the longest path from left to right (sorted by early start).

2. Reports:

   a. Total Float sorted low to high.

   b. Predecessors and Successors sorted by Activity ID.

3. Cost Flow Histogram

   a. Using the costs assigned to each activity, develop a Histogram that projects the estimated invoice amounts by month for the Project duration. The histogram shall be produced from the scheduling software on 11” by 17” paper (landscape mode). It shall contain both a monthly bar histogram and a cumulative cost curve on the same graph. The Total Costs shall be based on the Early Dates option.

4. Manpower Histogram

a. Submit a planned man-power graphic bar histogram produced from the scheduling software on 11” by 17” paper (landscape mode) that displays total man-hours based on Early Dates. Show both a weekly bar histogram and a cumulative curve on same graph. In addition, provide a summary excel table of average crew sizes and peak crew sizes broken down by trade/subcontractor. CONTRACTOR will need to perform their due-diligence to make sure that the activity man-power loading is realistic and adequate based on material /labor cost estimates.

5. Provide a written narrative as required by General Conditions.

6. Electronic data: Provide an electronic file in its original format of the Schedule. The electronic P6 files shall be saved in “XER” type format. (Version 15.1)

7. Plots: Produce a color bar chart on E-size paper (30 by 42-inch) organized (at a minimum) by project, area, stage, and substage.

M. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will notify CONTRACTOR of any adjustments that are required for the Proposed Baseline Schedule to be accepted. CONTRACTOR shall perform any required adjustments to the Proposed Baseline Schedule and resubmit it for acceptance certifying in writing that all information contained therein complies with the Contract Documents. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will review the Proposed Baseline Schedule for accuracy, reasonableness, and conformance with the Contract Documents and shall provide comments within ten (10) days of receipt. Within (5) five days after receiving HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT comments, CONTRACTOR shall both incorporate changes to address HACIENDA LA PUENTE UNIFIED SCHOOLDISTRICT concerns and resubmit the Proposed Baseline Schedule for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT backcheck. This process will continue until the Proposed Baseline Schedule is accepted as the Baseline Schedule. Once accepted by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, the Baseline Schedule will be the basis upon which CONTRACTOR shall prepare updates that record and report actual performance and progress. The accepted Baseline Schedule and subsequent Monthly Updates (reference General Conditions) shall be the basis for consideration and analysis of requests for time extensions and CONTRACTOR progress payments.

N. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT acceptance of the Baseline Schedule or CONTRACTOR’S failure to identify or include an element of the Contract, shall not release CONTRACTOR’S obligation to complete all required Work in accordance with the Contract Documents.

3.05 REQUIREMENTS FOR MONTHLY/WEEKLY SCHEDULE UPDATING

A. Once the Baseline Schedule is accepted by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, CONTRACTOR shall copy the Approved Baseline file to a new name, status the activities with actual as-built data through the end of the month and submit Monthly Schedule Updates beginning with month No. 1. The current month’s schedule update cannot be accepted until the previous Monthly Schedule Update has been accepted by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Each Monthly Schedule Update shall be submitted con-currently with the Monthly Pay Application no later than the fifth (5^{th}) day of the succeeding month in accordance with the General Conditions.

B. Monthly Schedule Update Format.

1. Initially, the CONTRACTOR shall status a current Monthly Schedule Update with actual Work progress only. No logic ties shall be modified. Status all Actual Start and Finish dates, adjust Remaining Durations where needed, and update Percent Completion of cost and resource loaded activities. No activity Original Durations

or Logic shall be changed unless authorized by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. No new activities shall be added (except for the addition of new activities for every re-submittal and re-review required) or unless authorized by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

2. Once the schedule is approved in accordance with the General Conditions, CONTRACTOR shall print (and submit with Monthly Schedule Update) a report of "out-of-sequence" logic that results from the updating process. CONTRACTOR shall then correct all "out-of-sequence" logic to reflect CONTRACTOR'S actual Work sequence. Prior to submission of the Monthly Schedule Update, CONTRACTOR shall review and validate that all remaining activities along with their schedule relationships are still accurate based on the actual workflow in the field. If CONTRACTOR chooses to modify logic or add activities (other than out-of-sequence corrections), it shall be done in accordance with the General Conditions for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Review & Approval. CONTRACTOR shall also submit a comparison report between the previous monthly schedule update and the current monthly update that will document the over-all changes (i.e., comparison software such as "Digger", or "Schedule Analyzer", etc.,).

3. During construction, CONTRACTOR may desire to break down specific activities into greater detail. If greater detail is necessary, then CONTRACTOR shall identify expanded activities such that the Baseline Schedule activities that the expanded activities originated from are readily apparent. CONTRACTOR shall not allow the aggregate duration of the expanded activities to exceed the duration assigned to the Baseline Schedule activity unless permitted by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT in writing.

4. Auto cost rules and calculation rules shall link Remaining Duration and Percent

5. Complete.

6. The Data Date for the Monthly Schedule Updates shall be the first day of the succeeding month. At a minimum, three (3) days prior to the submission of the Monthly Schedule Update, CONTRACTOR shall meet in person with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT to present the proposed Percentages of Completion and Actual Start and Actual Finish dates. Once percentages of completion and actual dates have been agreed to, they shall be the basis of the Monthly Schedule Update.

7. CONTRACTOR shall submit a Cost Histogram that overlays the planned cost curve from the Baseline Schedule, against the monthly cumulative "cost to date" curve, and against the remaining activities planned curve from the current Monthly Schedule Update.

8. Written Narrative Report: CONTRACTOR shall include a written report to explain the Monthly Schedule Update. The narrative shall, at a minimum include the following headings with appropriate discussions of each topic:

    a. Introduction.

    b. A Summary of Work which was on-going (This Pay Period).

    c. Problem Areas and Proposed Solutions.

    d. Critical Path.

    e. Current and Anticipated Delays.

    f. Coordination of Work with Others.

g. Milestone Status.

h. Revisions: the standard schedule comparison report that compares the current update to the previous update shall be submitted to help document any variances/changes. However, this comparison report will not be accepted by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT in lieu of the above written narrative requirements outline above.

9. In updating the Schedule, CONTRACTOR shall not modify Activity ID numbers, schedule calculation rules/criteria, or the Activity Coding Structure required.

10. Submit bar charts, reports, a cost flow histogram, man-power histogram, written narrative, electronic data, and plots in accordance with the General Conditions.

11. Submit a cost-loaded report (progressed monthly) produced from the scheduling software that displays all of the activities organized by the CSI section cost/resource accounts. This report shall be in compliance with the General Conditions, Section 01 29 73 (Schedule of Values), and Section 01 29 76 (Progress Payment Procedures).

C. Four-Week Rolling Schedule: At each Weekly Progress Meeting, CONTRACTOR shall present a Four-Week Schedule in Bar Chart format. It shall show one (1) week of actual and three (3) weeks of forecasted progress. The Four-Week Rolling Schedule shall be used as a basis for discussing progress and work planned during the three (3) weeks.

1. The Four-Week Rolling Schedule shall be based on the most recent HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Accepted Monthly Schedule Update. It shall include weekly updates to all construction, submittal, fabrication and procurement, and separate work contract activities. CONTRACTOR shall ensure that it accurately reflects the current progress of the Work.

2. CONTRACTOR shall discuss at the weekly Progress meeting the actual dates and any variances to critical or near critical activities.

3. Upon request by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, CONTRACTOR shall provide the Four-Week Rolling Schedule in electronic format.

4. If the Four-Week Rolling Schedule indicates activities are behind schedule, CONTRACTOR shall provide a Recovery Schedule in accordance with the General Conditions.

5. If the CONTRACTOR chooses to provide a Four-Week Rolling Schedule in a greater level of detail (by trade/subcontractor) outside of the monthly contractual P6 schedule database, then upon CONTRACTOR REQUEST and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT written approval, the CONTRACTOR may proceed as long as the detailed activities roll-up to the contractual P6 monthly schedule updates. These detailed activities will need to be linked to the overall Completion date as to properly forecast whether the project is ahead or behind schedule during the weekly Progress Meetings. The Four-Week Rolling Schedule must accurately reflect the work that is going on during the current week and must accurately reflect what will happen in the next three (3) weeks.

3.06 RECOVERY SCHEDULES

A. If a Monthly Schedule Update indicates negative float greater than ten (10) days on a critical path as result of events not predicated by the General Conditions CONTRACTOR shall prepare a Proposed Recovery Schedule demonstrating CONTRACTOR'S plan to regain the time lost. The Recovery Schedule shall be submitted either in advance of or concurrent with the Monthly Schedule Update and CONTRACTOR progress request. Both the Monthly Schedule Update and the Proposed Recovery Schedule shall be based on the same percentages of completion and actual dates accepted by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT under the General Conditions.

B. The Proposed Recovery Schedule shall be based on a copy of the Monthly Schedule Update for the calendar month during which the negative float first appears.

C. The Proposed Recovery Schedule shall include a written narrative that identifies the causes of the negative float on the critical path and provides CONTRACTOR'S proposed corrective action to ensure timely completion of all Milestones and the Completion Date. CONTRACTOR'S corrective actions shall include but are not limited to increasing concurrent operations, increasing labor, adding multiple shifts in a 24-hour period, and adding overtime.

D. During any period of time when CONTRACTOR is found to be behind schedule by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, the Monthly Schedule Update described above shall become a weekly requirement (at no additional cost to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT) to provide a greater degree of focus on the timely completion of the Work. These Updates shall be submitted to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT every Monday morning. When CONTRACTOR is deemed by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT to be back on schedule, CONTRACTOR may revert to submitting the schedule monthly.

E. CONTRACTOR'S progress payment may not be processed until HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT accepts the Proposed Recovery Schedule. Following such an acceptance, the Proposed Recovery Schedule will be known as the Recovery Schedule and future Work will be performed by CONTRACTOR in accordance with it.

3.07 FRAGNETS AND TIME EXTENSION REQUESTS

A. Float is not for exclusive use or benefit of either HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT or CONTRACTOR but is an expiring resource available to both parties on a non-discriminatory basis. If required to meet specified Milestones, either party may utilize float. Adjustments to Milestones or Contract Time will only be authorized by Change Order and only to the extent the claimed adjustments exceed total float along the most critical path of the current Monthly Schedule Update in effect at the time of the claimed adjustments. The claimed adjustments to the Milestones and/or Contract Time must also cause the Completion Date to exceed that currently indicated in the Monthly Schedule Update. No time extensions will be granted nor delay damages paid under contract until all available float is used and the CONTRACTOR obtains a Time Extension Request approval from the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT in accordance with the General Conditions in its entirety. CONTRACTOR claimed adjustments to an existing negative float path will not receive consideration until the activity with the highest negative float is driven even further negative.

1. Claimed adjustments to the Milestones or Contract Time will be administered in conjunction with those set forth in the General Conditions.

B. Pursuant to the float sharing requirements of this Section, the use of float suppression techniques such as preferential sequencing or logic, special lead or lag logic restraints, and extended activity times or durations are prohibited. The use of float time disclosed or implied by the use of alternate float suppression techniques shall be proportionally shared to benefit HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and CONTRACTOR. The use of any technique solely for the purpose of suppressing float will result in HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT rejection of the submitted Monthly Schedule Update.

C. In the event CONTRACTOR believes the Project has suffered an adverse impact arising from events predicated by the General Conditions, CONTRACTOR may prepare a Time Extension Request by submitting a Schedule Fragnet and a written narrative outlining the detail of the impact. A Schedule Fragnet must demonstrate a critical path delay. Such a delay must adversely impact the Completion Date for CONTRACTOR to receive a time extension. To demonstrate such an impact successfully, CONTRACTOR shall prepare a Schedule Fragnet based on a copy of HACIENDA LA PUENTE UNIFIED SCHOOL

DISTRICT accepted Monthly Schedule Update for the calendar month during which the adverse impact occurred. This "copy" of the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT accepted Monthly Schedule Update shall however first be updated (by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and CONTRACTOR jointly) with both Percentages of Completion and Actual Dates up to the day the delay commenced. This process will provide the "pre-delay" project status. Once HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and CONTRACTOR have agreed to the "pre-delay" project status, CONTRACTOR should make a copy of this "pre-delay" schedule and this copy is to be the starting point for CONTRACTOR'S Schedule Fragnet development. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will evaluate the activities, logic, durations, etcetera, in the Schedule Fragnet and will evaluate if the adverse impact arose from events described by the General Conditions. The Fragnet shall also include CONTRACTOR-caused delays that affect the critical or near critical path in the network and should be accounted for in the Time Impact Analysis if overlapped at any point in time with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT-caused delay. If rain impact days were granted between the Start and Finish of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT-caused delay period, they should be accounted for in the Time Impact Analysis as well. Provided HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT determines such an impact occurred, CONTRACTOR may be due a time extension equal to the number of proportioned days of variance/delay that resulted to the Completion Date.

D. Activities added into a Schedule Fragnet to demonstrate the impact of adverse event shall be assigned a unique activity code. The Schedule shall be organized by this unique activity code.

E. The Schedule Fragnet shall incorporate logic that accurately ties reflective of the adverse event to pre-event predecessor activities and post event successor activities.

F. The format and components of a Schedule Fragnet submittal shall be in accordance with this Section and the General Conditions. It is crucial for the Fragnet to be submitted within the same month of discovery so it can be resolved during the monthly schedule update review. The notice shall be transmitted to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT within the stipulations outlined in the General Conditions.

G. If HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT accepts CONTRACTOR'S Schedule Fragnet and an extension is granted, a Change Order will be prepared. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will advise what change order number the time extension will become. When CONTRACTOR receives this Change Order number, all the activities added to the Schedule Fragnet shall be given Activity Identification Numbers that corresponds with the Change Order number. CONTRACTOR shall cost load and resource-load the activities if required by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. If resource loading is required, the resource loading shall include a breakdown of labor, material, and equipment quantities.

H. If HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT rejects CONTRACTOR'S Schedule Fragnet in part based on improper forecast logic or activity tasks, then it shall be revised accordingly to conform to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S review comments and resubmitted. If the forecast logic and activity tasks cannot be agreed to then the pre-delay schedule outlined in the General Conditions shall be compared to the actual as-built data in the succeeding month of the encountering issue, event, condition, circumstance, and/or cause. The variance to the project between the pre-delay and post delay schedules shall be discussed in CONTRACTOR'S written narrative and proportioned between the different parties involved in the delay.

I. If HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT rejects CONTRACTOR'S Schedule Fragnet in whole, then CONTRACTOR may follow the procedures set forth in the General Conditions.

3.08 PAYMENT FOR SCHEDULING

A. The Work of this Section will be included as part of the bid price.

B. Preparation, revising, maintenance, and compliance with this Section and Section 01 29 73 is an integral part of the Contract Documents and is specified to have a minimum value equal to two percent (2%) of the original Contract Amount or $150,000, whichever is less. This amount shall be proportionally cost loaded into two (2) activities in both the Proposed Baseline Schedule and the Schedule of Values described in Section 01 29 73. One activity for the "Baseline Schedule" and the other activity for the "Monthly Schedule Update Process" as follows:

1. CONTRACTOR may allocate twenty percent (20%) of the total cost and place in the "Baseline Schedule" activity. It can then be billed against when the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT accepts the Proposed Baseline Schedule as the Baseline Schedule.

2. The remaining eighty percent (80%) may be cost loaded into the "Monthly Schedule Update Process" activity. This amount may be billed in equal monthly increments. The amount of those increments is determined by dividing the remaining cost by the total number of months in the Contract Time. Payment of these incremental amounts is contingent upon HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT acceptance of CONTRACTOR Monthly Schedule Updates, Recovery Schedules, Four-Week Rolling Schedules, Fragnets, Time Impact Analysis, and the updated Log of Required Submittals.

3. The CONTRACTOR shall anticipate in their base contract scope that numerous Fragnets and written time impact analyses will be required during the duration of the project with the Monthly Schedule Updates. Requests for extra scheduling services will not be considered until the CONTRACTOR demonstrates that all of the costs stipulated in the General Conditions has been expended.

3.09 FAILURE TO COMPLY WITH REQUIREMENTS

A. At any time during the project if CONTRACTOR fails to comply with the specified requirements, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT reserves the right to engage independent estimating and scheduling consultants to fulfill these requirements. Upon notice to CONTRACTOR, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall assess against CONTRACTOR, incurred costs for these additional services.

B. In such an event, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will require, and CONTRACTOR shall participate and provide requested information to ensure the resulting Milestones Schedule accurately reflects CONTRACTOR'S plan to execute the Work in compliance with the Contract Documents. If it becomes necessary for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT to recommend logic or duration revisions as a result of CONTRACTOR failure to furnish acceptable data, and if CONTRACTOR has objections to the recommendations, CONTRACTOR shall provide notice to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT within three (3) days and CONTRACTOR shall provide an acceptable alternate plan. If CONTRACTOR fails to so note any objections and provide an acceptable alternate plan, or if CONTRACTOR implements the recommendations of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT without so noting any objections, CONTRACTOR will be deemed to have waived all objections and concurred with the recommended logic/duration revisions provided by ARCHITECT and/or HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

C. Submittal of any Monthly Schedule Updates are subject to review and acceptance by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT retains the right, including, but not limited to the General Conditions, to withhold progress payments in whole or part until CONTRACTOR submits a Monthly Schedule Update acceptable to HACIENDA LA PUENTE UNIFIED SCHOOL

DISTRICT. If a Monthly Schedule Update is “Rejected” due to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT not receiving a satisfactory schedule that accurately reflects the on-going work activities, the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will mandate a separate meeting with the CONTRACTOR and approved Scheduler to remedy the non-conformance. If after the 2nd consecutive months, the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT still has to “Reject” the monthly Schedule update due to non-conformance, then the CONTRACTOR’S Scheduler will need to be replaced at no additional cost to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. CONTRACTOR shall within one week of disapproval, propose another Scheduler who meets the experience requirements stated in this Section.

3.10 CONTRACTOR RESPONSIBILITY

A. Nothing in this Section shall be construed to be a usurpation of CONTRACTOR authority, responsibility, and obligation to plan and schedule Work as CONTRACTOR deems necessary, subject to all other requirements of the Contract Documents.

B. CONTRACTOR shall involve the subcontractors, manufacturers, and suppliers in the development and periodic updating of the schedule.

3.11 RECORD DOCUMENTS / FINAL AS-BUILT SCHEDULE

A. Prior to Contract Completion of the Work, CONTRACTOR shall submit a final as-built schedule, and a time-scaled network diagram reflecting the actual dates of all activities. This shall be submitted prior to the final application of payment and prior to the request to release retention.

END OF SECTION

SECTION 01 32 20

CONSTRUCTION PROGRESS REPORTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Contract General Conditions and Supplementary General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Progress reports.

1.03 RELATED SECTIONS

A. Section 01 31 19 - Project Meetings: Review of demolition progress and submittals status at Project meetings.

B. Section 01 32 13 - Progress Schedules: Demolition Progress Schedule and Submittals Schedule.

C. Section 01 77 00 - Contract Closeout Procedures: Notice by CONTRACTOR of progress of the Work sufficient for Contract Completion review and Acceptance by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

1.04 PROGRESS REPORTS

A. Daily Log: CONTRACTOR shall maintain a written daily log at the job site in the Electronic Project Management system, within 24 hours and include the following information as a minimum:

1. Date.

2. Weather conditions.

3. Subcontractors and trades performing Work under the Agreement on the Site, and number of workers each, equipment and number of hours worked by each worker.

4. Others on the Site performing work for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT under separate contracts.

5. List of visitors to site, giving name, company, or agency affiliation and telephone number.

6. Descriptions of situations and circumstances which could delay normal progress of work, or which could be basis of claim for change in Contract Time or Contract Sum.

7. Changes to Work and who authorized changes.

8. Comments, as CONTRACTOR determines are appropriate for project record.

9. Inspection requests, inspections, and results of inspections.

B. Submission of Logs: Submit one (1) copy of daily logs to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S Representative and ARCHITECT on a daily basis, for review at Progress Meetings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 33

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Preconstruction photography.

2. Construction photography and time-lapse photography of work-in-progress.

1.02 GENERAL

A. Provide photographs at locations designated by ARCHITECT.

B. Photographer: Specialist, experienced in taking construction photography and time-lapse photography.

C. Equipment:

1. As necessary to photograph both interior and exterior exposures.

2. Utilize full range of lenses, including wide angle, telephoto, and 360 degrees.

3. If drones are used for aerial views, provide proof of FAA Certificated Drone Pilot and Drone Insurance.

1.03 SUBMITTAL REQUIREMENTS

A. Make photo submittals to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and ARCHITECT, along with each monthly Application for Payment.

B. Electronic Format:

1. Submit electronic files in jpeg format produced by digital camera with minimum resolution of not less than 3200 by 2400 pixels with minimum sensor size of eight (8) megapixels.

2. Submit without alteration, manipulation, editing, or modifications using image-editing software.

3. Date and Time: Include date and time in file name for each image.

C. Cloud based web application for 360-degree images shared with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, ARCHITECT, and CONTRACTOR.

1.04 PRE-CONSTRUCTION PHOTOGRAPHS

A. Take photographs prior to beginning Work of this Contract.

B. Provide ten (10) Project Site photographs.

1.05 PHOTOGRAPHS

A. Progress photography shall use both still and 360-degree photography to photo document work progress and site conditions. 360-degree photography shall use a cloud-based web application or program that allows photos to be organized and displayed on plan view drawings and accessed real time by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, ARCHITECT, and project team. At project closeout, deliver to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and ARCHITECT a stand-alone PDF export of the entire project photo documentation.

1. Take photographs, beginning two (2) weeks after last pre-construction photograph, and continuing every other week for duration of the Work.

2. Take a minimum of one (1) photo per area within the structure. For areas greater than 500 square feet, take one (1) photo for every 250 square feet of area. Take additional photographs as needed to fully document Project.

3. Take one (1) exterior photo every 300 feet of building perimeter. Take additional photographs as needed to fully document Project.

B. Provide three (3) independent single point stationary time-lapse photography cameras. The stationary time-lapse cameras shall be mounted to allow a wide range of view of the entire project. The location of stationary time-lapse cameras shall be approved by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and ARCHITECT. Time-lapse photos shall be taken every 10 minutes 24 hours per day seven days per week through the course of construction. Time-lapse photos shall be accessible real-time on the web. At project closeout, time-lapse photos shall be permanently archived and remain viewable by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and ARCHITECT.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for submittals required for the Work, including but not limited to, Shop Drawings, Product Data, Samples, material lists, and quality control items.

B. Throughout the Contract Documents, the minimum acceptable quality of materials, fabrication, and execution have been defined by the name and catalog number of a manufacturer and by reference of recognized industry standards.

C. To ensure that specified products are furnished and installed in accordance with the design intent, procedures have been established for submittal of design data and for its review by ARCHITECT, HACIENDA LA PUENTE UNIFIED DISTRICT, and others.

1.02 RELATED REQUIREMENTS

A. Section 01 29 73: Schedule of Values.
B. Section 01 29 76: Progress Payment Procedures.
C. Section 01 31 13: Project Coordination.
D. Section 01 31 26: Electronic Project Management System.
E. Section 01 32 13: Construction Schedule.
F. Section 01 50 00: Construction Facilities and Temporary Controls.
G. Section 01 74 16: Storm Water Pollution Prevention.
H. Section 01 77 00: Contract Closeout.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 PROCEDURES

A. CONTRACTOR shall submit a master list including all the submittals required by the contract documents (Submittal Log) within seven (7) days after contract award.

B. CONTRACTOR is required to review and approve every submittal and shop drawing prior to transmittal and delivery to ARCHITECT. Should CONTRACTOR determine a submittal contains errors, or does not meet the requirements of the contract, CONTRACTOR shall immediately return the submittals and shop drawings to the producer and expedite the corrections prior to transmitting the submittal to ARCHITECT. Submittals shall not be used by CONTRACTOR to request clarifications or submit questions. CONTRACTOR will affix stamp to each submittal certifying CONTRACTOR has performed, at minimum, the following:

1. Verified the submittal is complete in all respects and follows the requirements of the Contract Documents without variance.

2. Confirmed that no substitutions have been included. If substitutions are included, CONTRACTOR shall eliminate them from the submittal and process them in accordance with the General Conditions.

3. Identified any variances from the requirements of the Contract Documents and confirmed that the identified variance meets but does not exceed the allowable limitations or tolerances as defined in these specifications.

4. Verified that all submitted materials, dimensions and tolerances are compatible with existing or planned conditions of the Work in order to erect, fabricate, or install the submitted assembly in conformance with the requirements of the Contract Documents.

5. Coordinated and verified that the dimensions match CONTRACTOR measured field or installation conditions.

6. Coordinated and verified that the products of separate manufacturers required within any field produced assembly are compatible in all respects for such assembly.

7. Packaged together all related submittals or shop drawings where such is necessary for a comprehensive ARCHITECT review.

C. CONTRACTOR shall package each submittal appropriately for transmittal and handling. Transmittal format shall be as required by HACIENDA LA PUENTE UNIFIED DISTRICT. CONTRACTOR shall transmit and each submittal or re-submittal to ARCHITECT, trough the EPM see Section 01 31 26. Some specifications may require physical copies or samples to be provided. CONTRACTOR shall provide the HACIENDA LA PUENTE UNIFIED DISTRICT additional copies as specified or as requested by HACIENDA LA PUENTE UNIFIED DISTRICT. ARCHITECT will not accept submittals received from sources other than from CONTRACTOR.

D. After ARCHITECT'S review, ARCHITECT will transmit submittals to HACIENDA LA PUENTE UNIFIED DISTRICT and HACIENDA LA PUENTE UNIFIED DISTRICT shall further distribute to CONTRACTOR, INSPECTOR and others as required. Work shall not commence, unless otherwise approved by HACIENDA LA PUENTE UNIFIED DISTRICT, until approved submittals are transmitted to CONTRACTOR.

E. CONTRACTOR shall clearly identify any deviations from the Contract Documents on each submittal. Any deviation not so noted even though stamped reviewed is not acceptable.

F. CONTRACTOR shall coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities requiring sequential activity.

G. Timing of Submittals:

1. In accordance with General Conditions, CONTRACTOR shall submit to ARCHITECT, with copy of transmittal to the HACIENDA LA PUENTE UNIFIED DISTRICT, those Shop Drawings, Product Data, diagrams, materials lists, samples, and other submittals required by the Contract Documents.

2. The scheduling of submittals shall be sequenced to support the progress of the Work, and shall be:

   a. Submitted sufficiently in advance of construction, fabrication, or installation in order to allow time for transmittal, review, modification, correction, (and resubmission and re-review when required.)

   b. Phased with adequate time between submittals in order to allow for proper review by the ARCHITECT without negative impact to the Milestones Schedule.

   c. CONTRACTOR shall coordinate submittal of related items and ARCHITECT reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received by ARCHITECT.

d. CONTRACTOR shall revise, update, and submit submittal schedule to ARCHITECT and HACIENDA LA PUENTE UNIFIED DISTRICT on the first of each month, or as required by HACIENDA LA PUENTE UNIFIED DISTRICT.

e. CONTRACTOR shall allow in the Construction Schedule, at least ten (10) days for ARCHITECT review following ARCHITECT receipt of submittal.

f. No adjustments to the Contract Time or Milestones will be authorized because of a failure to transmit submittals to ARCHITECT sufficiently in advance of the Work to permit review and processing or where CONTRACTOR fails to provide ARCHITECT submittals on related items.

3. In case of product substitution, Shop Drawing preparation shall not commence until such time as HACIENDA LA PUENTE UNIFIED DISTRICT accepts or rejects the proposed substitution in accordance with the procedures described in the General Conditions.

H. If required, resubmit submittals in a timely manner. Resubmit as specified for initial submittal but identify as such. Review times for re-submitted items shall be as per the time frames for initial submittal review.

I. Shop Drawing preparation shall not commence until such time as CONTRACTOR receives Product Data acceptance.

J. ARCHITECT will stamp each submittal with a uniform, action stamp. ARCHITECT will mark the stamp appropriately to indicate the action taken, as follows:

1. Final Unrestricted Release: When ARCHITECT marks a submittal “Reviewed” the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

2. Final-But-Restricted Release: When ARCHITECT, or authorized agent, marks a submittal “Reviewed as Noted,” the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.

3. Returned for Re-submittal: When ARCHITECT, or authorized agent, marks a submittal “Rejected, Revise and Resubmit,” do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat as necessary to obtain different action mark. In case of multiple submittals covering same items of Work, CONTRACTOR is responsible for any time delays, schedule disruptions, out of sequence Work, or additional costs due to multiple submissions of the same submittal item. Do not use, or allow others to use, submittals marked “Rejected, Revise and Resubmit” at the Project site or elsewhere where Work is in progress.

4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, ARCHITECT, or authorized agent, will return the submittal marked “Action Not Required “.

3.02 SHOP DRAWINGS

A. Shop Drawings are original drawings prepared by CONTRACTOR, Sub-contractor, supplier, or distributor illustrating some portion of Work by showing fabrication, layout, setting, or erection and shall not be based on reproduced Contract Documents or copied standard information.

B. Produce Shop Drawings to an accurate scale that is large enough to indicate all pertinent features and methods. Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 24 by 36 inches.

C. Shop Drawings shall include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:

1. Dimensions.
2. Identification of products and materials included by sheet and detail number.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.

D. Provide a space of approximately 4 by 5 inches on the label or beside the title block on Shop Drawings to record CONTRACTOR and ARCHITECT review, and the action taken. Include the following information on the label for processing and recording action taken:

1. Project name.
2. Date.
3. Name and address of ARCHITECT.
4. Name and address of CONTRACTOR.
5. Name and address of Subcontractor.
6. Name and address of supplier.
7. Name and address of manufacturer.
8. Name and title of appropriate Specification section.
9. Drawing number and detail references, as appropriate.

E. Unless otherwise agreed to or indicated in individual Specification sections, submit a sufficient number of sets to allow for adequate distribution to CONTRACTOR, Sub-Contractor, supplier, manufacturer, and fabricators, plus four (4) sets (two (2) sets to be retained by ARCHITECT, one (1) set to the INSPECTOR, and one (1) set to HACIENDA LA PUENTE UNIFIED DISTRICT).

3.03 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of Work or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams, and templates, wiring diagrams, schedules, illustrations, or performance curves.

1. Mark each copy to show or delineate pertinent materials, products, models, applicable choices, or options. Where Product Data includes information on several products that are not required, clearly mark copies to indicate the applicable information. Include the following information:

a. Manufacturer's printed recommendations.
b. Compliance with trade association standards.
c. Compliance with recognized testing agency standards.
d. Application of testing agency labels and seals.
e. Notation of dimensions verified by field measurement.
f. Notation of coordination requirements.
g. Notation of dimensions and required clearances.
h. Indicate performance characteristics and capacities.
i. Indicate wiring diagrams and controls.

B. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed by CONTRACTOR.

C. Required Copies and Distribution: Same as denoted in Article 3.02.E.

3.04 SAMPLES

A. Procedure:

1. Submit Samples of sufficient size, quantity, cured, and finished and physically identical to the proposed product or material. Samples include partial or full sections or range of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches denoting color, texture, and/or pattern.

    a. Mount or display Samples in the manner to facilitate review of qualities indicated. Include the following:

        1) Specification section number and reference.
        2) Generic description of the Sample.
        3) Sampling source.
        4) Product name or name of manufacturer.
        5) Compliance with recognized standards.
        6) Availability and delivery time.

2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

    a. Where variations in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show the approximate limits of the variations.

    b. Refer to other Specification sections for requirements for Samples that illustrate materials, fabrication techniques, assembly details, connections, operation, and similar construction characteristics.

    c. Refer to other sections for Samples to be returned to CONTRACTOR for incorporation into the Work. Such Samples must be undamaged at time of installation. On the transmittal indicate special requests regarding disposition of Sample submittals.

    d. Samples not incorporated into the Work, or otherwise not designated as HACIENDA LA PUENTE UNIFIED DISTRICT property, remain the property of CONTRACTOR and shall be removed from the Project site prior to Substantial Completion.

3. Color and Pattern: Whenever a choice of color or pattern is available in a specified product, submit accurate color chips and pattern charts to CENTRAL BASIN MUNICIPAL WATER HACIENDA LA PUENTE UNIFIED DISTRICT for review and selection.

4. Number Required: Submit six (6), minimum, of each. Two (2) will be returned to CONTRACTOR.

B. When specified, erect field samples and mock-ups at the Project site to illustrate products, materials, fabrications, or execution and to establish standards by which completed Work shall be judged.

C. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of the Work. Sample sets may be used to obtain final acceptance of the Work associated with each set.

3.05 QUALITY CONTROL SUBMITTALS

A. Submit quality control submittals, including design data, certifications, manufacturer's field reports, and other quality control submittals as required under other sections of the Contract Documents.

B. When other sections of the Contract Documents require manufacturer's certification of a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.

C. Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the represented company.

D. Requirements for submittal of inspection and test reports are specified in other sections of the Contract Documents.

END OF SECTION

SECTION 01 33 60

ELECTRONIC DOCUMENT REQUEST

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

A. Procedure for obtaining electronic computer-aided design drafting (CADD) version of Contract Document Drawings.

1.02 STIPULATIONS AND CONDITIONS

A. Electronic documents are not Contract Documents.

B. Electronic documents are provided by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT to CONTRACTOR for CONTRACTOR'S convenience.

C. Electronic Documents will be transmitted to CONTRACTOR by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT only after the CONTRACTOR agrees to and sign the Electronic Files Waiver.

D. Electronic documents may be used for no other purposes than for Project for which Contract Documents were prepared.

E. Waiver form to be provided by the ARCHITECT after NTP.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 35 00

SPECIAL PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Construction Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Contract General Conditions and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Environmental protection procedures
B. Smoke/odor control procedures
C. Noise control procedures
D. Dust and air pollution control procedures
E. Hazardous materials procedures
F. Welding and burning mitigation procedures.
G. Erosion and sediment control procedures (Storm Water Pollution Protection Plan)
H. Disposal operations procedures
I. Cultural resources procedures
J. Alteration project procedures.

1.03 RELATED SECTIONS

A. Section 01 74 16 - Storm Water Pollution Prevention Plan.

1.04 ENVIRONMENTAL PROTECTION PROCEDURES

A. Environmental Protection Procedures, General: Requirements specified in this Section are in addition to those of the Contract General Conditions.

1. During the progress of the work, keep the premises occupied in a neat and clean condition and protect the environment both on site and off site, throughout and upon completion of the construction project.

2. In coordination with the Campus, develop an Environmental Protection Plan in detail and submit to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT for approval within thirty (30) calendar days from the date of commencement specified in the Notice to Proceed. Distribute approved plan to all employees and to all subcontractors and their employees. Environmental Protection Plan shall include, but not be limited to, the following items:

a. Copies of required permits.

b. Proposed sanitary landfill site.

c. Other proposed disposal sites

d. Noise Control

e. Dust Control

f. Erosion and Sediment Control

g. Copies of any agreements with public or private landowners regarding equipment, materials storage, borrow sites, fill sites, or disposal sites. Such agreements made by CONTRACTOR shall be invalid if their execution causes violation of local or regional grading or land use regulations.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.

1. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

2. Comply with noise control requirements specified below.

C. Operations: All operations shall comply with all applicable Federal, State, and local Codes, ordinances, statutes, and regulations pertaining to water, air, solid waste, and noise pollution. It shall be CONTRACTOR'S responsibility to identify and determine necessary measures to be taken to comply with such Codes, ordinances, statutes, and regulations.

D. Definitions of Contaminants:

1. Sediment: Soil and other debris that have been eroded and transported by runoff water

2. Solid waste: Rubbish, debris, garbage, and other discarded solid materials resulting from construction activities, including a variety of combustible and non-combustible wastes, such as ashes, waste materials that result from construction or maintenance and repair work, leaves, and tree trimmings.

3. Chemical waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, disinfectants, organic chemicals, and inorganic wastes. Some of the above may be classified as "hazardous."

4. Sanitary wastes:

a. Sewage: Domestic sanitary sewage

b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing and consumption of food.

E. Hazardous Materials: See also Section below titled "HAZARDOUS MATERIALS PROCEDURES."

1. Except as otherwise specified, in the event the CONTRACTOR encounters on the site material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), or other hazardous materials which have not been rendered harmless, the CONTRACTOR shall immediately stop Work in the area affected and report the condition to the DISTRICT in writing.

2. Work in affected areas shall not thereafter be resumed except by written agreement of the DISTRICT and CONTRACTOR if in fact the material is asbestos, PCB, or other hazardous materials and has not been rendered harmless.

3. Work in affected areas shall be resumed in the absence of asbestos, PCB, or other hazardous materials, or when such materials have been rendered harmless.

F. Protection of Natural Resources: It is intended that the natural resources within the Project boundaries and outside the limits of permanent work performed under this Contract be preserved in their existing condition or be restored to an equivalent or improved condition upon completion of the work. Confine construction activities to areas defined by the public roads, easements, and work area limits shown on the drawings. Return construction areas to their pre-construction elevations except where surface elevations are otherwise noted to be changed. Maintain natural drainage patterns. Conduct construction activities such that ponding of stagnant water conducive to mosquito breeding habitat will not occur at any time.

1. Land resources protection: Do not remove, cut, deface, injure, or destroy trees or shrubs outside the work area limits. Do not remove, deface, injure, or destroy trees within the Project area without permission from HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Such improvements shall be removed and replaced, if required, by the CONTRACTOR at no change in Contract Time and Contract Sum.

2. Landscaping protection: Protect trees that are located near the limits of Project area which may possibly be defaced, bruised, or injured or otherwise damaged by the CONTRACTOR'S operations. No ropes, cables, or guys shall be fastened to or be attached to any existing nearby trees or shrubs for anchorages. Refer to additional requirements specified in Section 01 56 00 - Temporary Barriers and Controls.

    a. Repair and restoration: Repair or replace trees or other landscape feature scarred or damaged by equipment or demolition operations as specified below. Repair and restoration plan shall be reviewed and approved by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT prior to its initiation.

3. Temporary Construction:

    a. Remove all signs of temporary facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction as directed by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

    b. Level all temporary roads, parking areas and any other areas that have become compacted or shaped.

    c. Unpaved areas where vehicles have been operated shall receive suitable surface treatment or shall be periodically wetted down to prevent operations from producing dust damage and nuisance to persons and property, at no additional cost to the DISTRICT.

    d. Keep haul roads clear at all times of any object that creates an unsafe condition. Promptly remove any contaminants or materials dropped from construction vehicles. Do not drop mud and debris from equipment on public streets. Sweep clean turning areas and pavement entrances as necessary.

4. Water Resources: Comply with all applicable Federal, State, and local Codes, ordinances, statutes, and regulations pertaining to discharge (directly or indirectly) of pollutants to underground and natural waters.

    a. Perform all Work under the Contract in a manner that any adverse environmental impacts are reduced to a level that is acceptable to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and authorities having jurisdiction.

b. Refer to Division 02 - Site Construction, earthwork Sections, and Drawings for specific requirements on control of storm water and disposal of water from dewatering activities.

G. Oily Substances: At all times, special measures shall be taken to prevent oily or other hazardous substances from entering the ground, drainage areas or local bodies of water in such quantities as to affect normal use, aesthetics or produce a measurable impact upon the areas. All soil or water that is contaminated with oily substances due to CONTRACTOR'S operations shall be disposed of in accordance with applicable regulations, at no change in Contract Time and Contract Sum.

H. Report to the DISTRICT all fuel, chemical, hydraulic fluid or other material spills, leaks, and other incidents due to human or natural causes for evaluation. All work in the affected area shall stop until the DISTRICT can complete its review. Should the DISTRICT determine environments consultants, the CONTRACTOR will comply with any required assistance in the environmental review. All contamination shall be dealt with in accordance with all applicable laws and regulations.

1.05 SMOKE/ODOR CONTROL PROCEDURES

A. Smoke/Odor Control: Protect primary fresh air intakes to existing buildings from exhaust from internal combustion engines, paint and solvent fumes and other noxious fumes and vapors.

1. Implement control methods such as snorkels from engines exhausts to 50 feet away from air intakes. Provide carbon filters on air intakes as necessary, including periodic replacement of filters to ensure effectiveness.

2. All other activities generating fumes shall be limited to minimum distance of 50 feet from air intake grilles.

3. If fume-generating procedures must occur within 50 feet of an air intake, CONTRACTOR shall do the following:

a. Notify HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT at least fourteen (14) calendar days in advance of such activities.

b. Perform Work when it least impacts the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT (evenings, weekends, or particularly windy days).

c. Provide carbon filter media, plastic barriers, or other control methods to ensure fresh air only enters into the building ventilation system.

1.06 NOISE CONTROL PROCEDURES

A. Noise Control Procedures, General: Requirements of this Section are in addition to those of the Contract General Conditions. Maximum noise levels within 1,000 feet of residences, businesses, adjacent buildings, and other populated areas:

1. Noise levels for trenchers, pavers, graders, and trucks: Not exceeding 90 dBA at 50 feet as measured under noisiest operating conditions.

2. Noise levels for all other equipment: Not exceeding 85 dBA at 50 feet.

B. Noise Control of Equipment:

1. Equip jackhammers with exhaust mufflers and steel muffling sleeves.

2. Use air compressors of a quiet type such as a "whisperized" compressor. Compressor hoods shall be closed while equipment is in operation.

3. Use electrically powered rather than gasoline or diesel-powered fork-lifts.

C. Noise Control of Operations:

1. Keep noisy equipment as far as possible from noise-sensitive site boundaries.

2. Machines shall not be left idling.

3. Use electric power in lieu of internal combustion engine power whenever possible.

4. Maintain equipment properly to reduce noise from excessive vibration, faulty mufflers, or other sources. All engines shall have properly functioning mufflers.

D. Scheduling of Noisy Operations: Schedule activities to minimize time of noisy operations and disruption to occupants of adjoining facilities. Notify HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT in advance of performing Work creating unusual noise and schedule such Work at times mutually agreeable.

E. Accessory Noise: Do not play radios, tape recorders, televisions, and other similar items at construction site.

1.07 DUST AND AIR POLLUTION CONTROL PROCEDURES

A. Dust and Air Pollution Control Procedures, General: Requirements of this Section are in addition to those of the Contract General Conditions. Employ measures to prevent or minimize creation of dust and air pollution. CONTRACTOR shall appoint a dust control monitor to oversee and implement all measures specified in this Section.

B. Provide proper barricades and take all other necessary measures required to prevent dust and fumes from migrating to other buildings. Fumes from welding and epoxy operations shall be properly ventilated away from building at all times. CONTRACTOR shall control dust properly throughout the construction period at the construction site, corporation yard (if applicable), dirt borrow site (if Applicable), and dirt access route. Should dust or fumes migrate to other building areas, it shall be the CONTRACTOR'S responsibility to clean immediately the affected occupied areas and mechanical equipment, including air handlers and ductwork. CONTRACTOR shall be responsible and liable for all associated damages and costs due to dust and fume damage.

1. Unpaved areas shall be wetted down, to eliminate dust formation, a minimum of twice a day to reduce particulate matter. When wind velocity exceeds 15 mph, site shall be watered down more frequently.

2. Store all volatile liquids, including fuels or solvents in closed containers.

3. No on-site burning of debris, lumber and other scrap shall be permitted.

4. Properly maintain equipment to reduce gaseous pollutant emissions.

5. Exposed areas, new driveways and sidewalks shall be seeded, treated with soil binders, or paved, as appropriate, as soon as possible.

6. Cover stockpiles of soil, sand, and other loose materials.

7. Cover trucks hauling soil, debris, sand, or other loose materials.

8. Sweep project area streets at least once daily. Refer to Section 01 74 00 - Cleaning Requirements.

1.08 WELDING AND BURNING MITIGATION PROCEDURES

A. Welding and Burning Mitigation Procedures: Eliminate welding and burning of steel as much as possible. Where unavoidable, perform welding and burning with all possible precaution to avoid fire hazard. Provide a fire watch for minimum of 30 minutes after burning stops. Provide protection for all adjacent surfaces.

B. Precautions shall be taken during the construction phase to minimize the likelihood of ignition.

1. Smoking is prohibited within 50 feet of the work area or material storage area.

2. Open flames or heat sources required for demolition will be closely monitored to minimize the risk of accidental ignition.

3. Fire extinguishers and water hoses shall be made readily available by the CONTRACTOR and maintained in case of emergency.

1.09 EROSION AND SEDIMENT CONTROL PROCEDURES

A. Erosion and Sediment Control Procedures: Refer to runoff control requirements specified in the Contract General Conditions. Obtain and comply with Storm Water Pollution Protection Plan (SWPPP) and project-specific requirements indicated on Civil Drawings.

1.10 DISPOSAL OPERATIONS PROCEDURES

A. Solid Waste Management:

1. Supply solid waste transfer containers. Daily remove all debris such as spent air filters, oil cartridges, cans, bottles, combustibles, and litter. Take care to prevent trash and papers from blowing onto adjacent property. Encourage personnel to use refuse containers. Convey contents to a sanitary landfill.

2. Washing of concrete containers where wastewater may reach adjacent property, storm drains, or natural water courses will not be permitted. Remove any excess concrete to the sanitary landfill.

B. Chemical Waste and Hazardous Materials Management: furnish containers for storage of spent chemicals used during construction operations. Dispose of chemicals and hazardous materials in accordance with applicable regulations.

C. Garbage: Store garbage in covered containers, pick up daily and dispose of in a sanitary landfill.

D. Grading Spoil and Landscape Debris: Dispose of vegetation, weeds, rubble, and other materials removed by the clearing, stripping, and grubbing operations off site at a suitable disposal site in accordance with applicable Federal, State, and local Codes, ordinances, statutes, and regulations.

1.11 CULTURAL RESOURCES PROCEDURES

A. Cultural Resources Procedures: Requirements specified in this Section are in addition to those required by the Contract General Conditions.

1. Project does not pass through any known archaeological sites. However, it is conceivable that unrecorded archaeological sites could be discovered during construction.

2. In the event that artifacts, human remains, or other cultural resources are discovered during subsurface excavations at locations of the Work, the CONTRACTOR shall protect the discovered items, cease work for a distance of 35 feet radius in the area, notify the ARCHITECT and DISTRICT and comply with applicable law.

3. DISTRICT may retain an Archaeologist to monitor and recover data and artifacts during period that work has ceased.

4. All items found which are considered to have archaeological significance are the property of the DISTRICT.

1.12 ALTERATION PROJECT PROCEDURES

A. Coordinate the work of trades and schedule elements of alterations and renovation work by procedures and methods to expedite completion of the work.

B. In addition to demolition specifically shown, cut, move, or remove items as necessary to provide access or to allow alterations and new work to proceed. Include such items as:

1. Repair or removal of hazardous or unsanitary conditions.

2. Removal of abandoned items and items serving no useful purpose, such as abandoned piping, conduit, and wiring.

3. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals, and deteriorated concrete.

4. Cleaning of surfaces, and removal of surface finishes as needed to install new work and finishes.

C. Patch, repair, and refinish existing items to remain, to the specified condition for each material, with a smooth and clean transition to adjacent new items of construction.

D. Assign the work of moving, removal, cutting, and patching, to trades qualified to perform the work in a manner to minimize the possibility of damage to each type of work, and provide means of returning surfaces to appearance of new work.

E. Perform cutting and removal work with minimal disruption and in a manner to avoid damage to adjacent work.

F. Cut finish surfaces such as masonry, tile, plaster, or metals, using methods that terminate surfaces in a straight line at a natural point of division.

G. Protect existing finishes, equipment, and adjacent construction that is scheduled to remain, from damage.

1. Protect existing and new work from weather and extremes of temperature.

2. Maintain existing interior work above 60 degrees F.

3. Provide weather protection, waterproofing, heat, and humidity control as needed to prevent damage to remaining work and to new work.

1.13 BLASTING CONTROL AND SAFETY PLAN

A. If the CONTRACTOR decides to blast to remove rock, prior to construction, the CONTRACTOR shall prepare a Blasting Control and Safety Plan. This Plan shall indicate the location of all blasting activity, anticipated dates/times and pedestrian, construction worker and equipment/vehicle safety mechanisms that must be in place to ensure public safety. All blasting must occur within the parameters of the Blasting Control and Safety Plan.

PART 2 - PRODUCTS

2.01 PRODUCTS FOR PATCHING, EXTENDING, AND MATCHING

A. Provide same products or types of construction as that in existing structure, as needed to patch, extend, or match existing.

B. Generally, the Contract Documents will not define products or standards of workmanship present in existing construction; determine products by inspection and necessary testing and determine quality of workmanship by using existing as a sample for comparison.

C. The presence of a product, finish, or type of construction requires that patching, extending, or matching shall be performed as necessary to make work complete and consistent with identical standards of quality.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 3500A

QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in Sections that specify those activities. Requirements of this Section relate to customized fabrication and installation procedures specified in those Sections. Requirements in those Sections may also cover production of standard products.

2. Specified tests, inspections and related actions described herein or elsewhere in the Contract Documents do not constitute a limitation on Contractor's responsibility to establish and maintain quality-control procedures that comply with requirements of the Contract Document or Applicable Laws.

1.02 RELATED DOCUMENTS

A. Construction Documents as defined in the Construction Services Agreement.

B. Construction Services Agreement.

C. Other General Requirements.

D. Divisions 2 through16 Sections for specific test and inspection requirements.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM E 548 Guide for General Criteria Used for Evaluating Laboratory Competence.

1.04 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions (other than construction administration activities performed by Architect) that occur during and after execution of Work to evaluate that completed Work complies with requirements of Contract Documents and Applicable Laws.

C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample Submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation. Mockups are not Samples. Mockups establish standard by which Work will be judged.

D. Testing Agency: Entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean same as testing agency.

1.05 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by design professional are specifically required of Contractor by Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit written request for additional information to Architect.

2. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required Submittals, submit statement, signed and sealed by responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by design professional, indicating that products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.06 REGULATORY REQUIREMENTS

A. Copies of Regulations: Obtain copies of following regulations and retain at Site to be available for reference by parties who have reasonable need. Documents include, but are not limited to:

1. Additional documents as requested by Project Inspector, Program Manager or Architect.

1.07 SUBMITTALS

A. Reports:

1. Either Contractor (in those instances where the Contractor is responsible under the Contract Documents for testing or inspection) or the independent testing or inspection agency responsible for the testing or inspection shall submit certified written report of each inspection, test, or similar service, with copies to Project Inspector, Contractor and Architect. Submit additional copies of each written report directly to Governmental Authorities, when so directed by the Governmental Authorities.

2. Such reports shall include following:

a. Date of issue.

b. Project title and number.

c. Name, address, and telephone number of testing agency.

d. Dates and locations of samples and tests or inspections.

e. Names of individuals making tests and inspections.

f. Description of Work and test and inspection method.

g. Identification of product and Specification Section.

h. Complete test or inspection data.

i. Test and inspection results and interpretation of test results.

j. Ambient conditions at time of sample taking and testing and inspecting.

k. Comments or professional opinion on whether tested or inspected Work complies with Contract Document requirements.

l. Name and signature of laboratory inspector.

m. Recommendations on retesting and reinspecting.

B. Permits, Licenses, and Certificates: For District's records, submit copies of permits, licenses, certifications and inspection reports required by Applicable Laws or requirements of Contract Documents.

1.08 QUALITY ASSURANCE

A. Specialists: Certain sections of Specifications may require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.

1. Requirement for specialists shall not supersede building codes and other Applicable Laws nor interfere with local trade-union jurisdictional settlements and similar conventions.

B. Testing Agency Qualifications: Agency with experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

C. Preconstruction Testing: Where required by other Sections, testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.

1. Contractor responsibilities include following:

a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.

b. Submit specimens in timely manner with sufficient time for testing and analyzing results to prevent any Delay to the performance of the Work.

c. Fabricate and install test assemblies using installers who will perform same tasks for Project.

d. When testing is complete, remove assemblies; do not reuse materials on Project.

2. Testing Agency Responsibilities: Submit certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor and Project Inspector. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from Contract Documents.

D. Mockups: Before installing portions of Work requiring mockups, build mockups for each form of construction and finish required to comply with following requirements, using materials indicated for completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.

a. As a minimum, include the following for mock-up: Metal Wall Panel System, Glazed Aluminum Curtain Wall System with all glass types (colors) specified, Portland Cement Plaster on Lath and on CMU/Studs, ceramic tile floors and walls, exterior concrete finishes.

b. Mockups shall be provided for all conditions and details where different materials meet as shown on the Drawings.

c. Mockup Layout to be provided in Submittal format for review prior to Installation of Mock up. Example of Submittal Mockup Layout is provided after the end of this specification.

d. Minimum 6-foot long by 4-foot high panel of vertical masonry, including special features and one corner or angle. Panel to include:

a. Plaster finish

b. Reveals

c. Connection to glazing.

d. Parapet cap.

2. Notify Project Inspector and Architect seven (7) days' in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction and/or modify or replace Mock-up until mock-up is approved.
5. Maintain mockups during construction in undisturbed condition as standard for judging completed Work.
6. Final disposition of mockups shall be as specified in individual Specification Sections.

1.09 QUALITY CONTROL

A. District Responsibilities: Where quality control services are indicated as District's responsibility, District will engage qualified testing agency to perform these services.

1. District will furnish Contractor with names, addresses and telephone numbers of testing agencies engaged and description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made to testing and inspecting agency by the Program Manager on behalf of the District.
3. Costs for retesting and reinspecting of construction that constitutes a replacement or repair to Work that fails, or that is necessitated due to Work failing, to comply with Contract Documents will be at the expense of Contractor and without adjustment to the Guaranteed Maximum Price.

B. Contractor Responsibilities: Unless otherwise indicated, provide quality control services specified and required by Governmental Authorities.

1. Engage qualified testing agency to perform these quality control services.
2. Contractor shall not employ same entity engaged by District, unless agreed to in writing by District.
3. Notify testing agencies at least forty-eight (48) hours in advance of time when Work that requires testing or inspecting will be performed.
4. Testing and inspecting requested by Contractor and not required by Contract Documents are Contractor's responsibility and performed at Contractor's own expense, without adjustment to the Guaranteed Maximum Price.
5. The Contractor shall submit a statement of responsibility for the construction of lateral forces resisting system complying with 2019 CBC Section 1704A.4

C. Special Tests and Inspections: District will engage testing agency to conduct special tests and inspections required by Governmental Authorities and that under the Contract Documents are the responsibility of District.

1. Testing agency will notify Project Inspector, Architect and Contractor promptly of irregularities and deficiencies observed in Work during performance of its services.
2. Testing agency will submit certified written report of each test, inspection, and similar quality control service to Project Inspector, Architect, with copy to Contractor and to Governmental Authorities.
3. Testing agency will submit final report of special tests and inspections at Substantial Completion, which includes list of unresolved deficiencies.

4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from Contract Documents.

5. Testing agency will retest and reinspect corrected Work. Costs of retesting that is necessitated due to a failure by the Work to comply with the Contract Documents shall be at the Contractor's expense and without adjustment to the Guaranteed Maximum Price.

D. Manufacturer's Field Services: Where indicated, Contractor shall engage factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Contractor shall report results in writing to the District Representative.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, Contractor shall provide at its own expense and without adjustment to the Guaranteed Maximum Price the necessary services of retesting and reinspection of the Work that is replaced or repaired due to a failure of the Work to comply with requirements of Contract Documents.

F. Testing Agency Responsibilities: Testing agencies shall cooperate with Architect, Contractor and Project Inspector in performance of their duties. Testing agencies shall provide qualified personnel to perform required tests and inspections, including the following:

1. Notify Contractor, Architect, and Project Inspector promptly of irregularities or deficiencies observed in Work.

2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the requirements of the Contract Documents.

3. Submit certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.

4. Do not release, revoke, alter, or increase requirements of Contract Documents or approve or accept any portion of Work.

5. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to:

1. Access to Work.

2. Incidental labor and facilities necessary to facilitate tests and inspections.

3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency or District in obtaining samples.

4. Facilities for storage and field-curing of test samples.

5. Where required by testing agencies, delivery of samples to testing agencies.

6. Preliminary design mix proposed for use for material mixes that require control by testing agency.

7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Contractor shall coordinate sequence of activities to accommodate required quality-assurance and quality-control services without Delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare schedule of tests, inspections, and similar quality- control services required by Contract Documents. Submit schedule within fourteen (14) days of issuance of Notice to Proceed.

1. Distribution: Distribute schedule to Project Inspector, Architect, testing agencies, and each party involved in performance of portions of Work where tests and inspections are required.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.01 TESTING AGENCIES

A. Testing agencies and labs shall be DSA-Approved.

3.02 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Sections of the Specifications. Restore patched areas and extend restoration into adjoining areas in manner that eliminates evidence of patching.

2. Comply with Contract Document requirements.

B. Protect construction exposed.

C. Repair and protection are sole Contractor's responsibility, regardless of assignment of responsibility for quality control services.

END OF SECTION

(See Mockup Layout Example on next page)

MOCK-UP LAYOUT EXAMPLE
(For reference Only-Sizes may vary)

Note: Layout is for reference only and does not represent this projects actual mockup layout.
Note: Dimensions are for reference only

Items to be included in mockup, but not limited to:
Include Concrete curb and studs or CMU with plaster system mockup.
Include Concrete curb and studs or CMU with metal wall panel system mockup.
Include Concrete curb at storefront and glass mockup.
Include furring channels for wood panel system mockup.
Include exterior concrete slab with types of finishes.
Include depressed concrete slab for all floor tile types in mockup.
Include studs or CMU for wall tile mockup.

Mockup to be approximately 4-6 feet tall.
Mockup to provide reveal joints, end and corner conditions, base conditions, and parapet conditions, etc.

Also see specification section for each product for more information.

SECTION 01 35 29

HEALTH AND SAFETY REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. This Section addresses special procedures and requirements that shall be followed for protection of health and safety of persons at the Project Site.

B. CONTRACTOR is responsible for site health and safety of its personnel and those of its subcontractors. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S CONSTRUCTION MANAGER is not responsible for health and safety at the site.

C. Health and safety requirements established in this Section are based on Site conditions anticipated from available Site data.

1. Procedures are intended for Work activities including, but not limited to:

a. Hazardous Materials Abatement
b. Scaffolding (if necessary)
c. Ladders
d. Crane Operations
e. Work on roofs
f. Demolition
g. Shoring
h. Backfilling
i. Confined Space Entry

2. CONTRACTOR shall be responsible for reviewing and revising their safety program based on actual conditions encountered at the Site and to conform with all applicable laws and regulations.

D. Before Work at the Site proceeds, all personnel involved in performing Work activities shall read, understand, and sign the Site Health and Safety Plan (SHSP) prepared by CONTRACTOR.

1.02 SUBMITTALS

A. Submit as specified in Section 01 33 00.

B. Submittals shall include, but are not limited to:

1. Site health and safety plan (SHSP).
2. Personnel certificates of training.
3. Daily logs of air monitoring.
4. Site entry register.

1.03 SITE HEALTH AND SAFETY PLAN

A. CONTRACTOR shall protect workers and the public from inadvertent entry into the site. The existing perimeter site fence shall remain during demolition. CONTRACTOR shall maintain and repair site perimeter fences during demolition services and fencing shall continuously remain in a secure and safe condition until the successful completion of contract work. CONTRACTOR is responsible to protect and secure the demolition site using at minimum chain link construction fencing sufficiently installed, secured, and maintained to prevent unauthorized access to the site.

B. The CONTRACTOR shall be required to prepare and implement a Site-specific Health and Safety Plan ("HASP") in accordance with the company requirements specified in Section 01 35 29, Health and Safety Requirements and all applicable federal and state and local regulations.

C. The CONTRACTOR shall develop a Site-Specific HASP for their operations that meets the requirements of applicable federal, state, and local requirements as well as the company requirements. The CONTRACTOR shall implement this plan taking precautions as necessary to protect the public and work force personnel from potential hazards. The CONTRACTOR shall utilize personnel with approved training as specified in Section 01 35 29 - Health and Safety Requirements. The CONTRACTOR shall handle all wastes in accordance with applicable federal, state, and local requirements.

D. Protection of Personnel & Public - CONTRACTOR shall conduct Work in a safe, workmanlike manner. Every excavation or area of construction on a site located five feet or less from the street or right of way line shall be enclosed with a suitable barrier to prevent the entry of unauthorized persons. Where located more than five feet from the street lot line, a barrier shall be erected, where required by the code official. All barriers shall be of adequate strength to resist wind pressure as specified by the Code Official. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, may remain standing without additional bracing, shoring, or lateral support until demolished, unless directed otherwise by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

E. CONTRACTOR shall provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement require approval by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT to performing such work.

F. General: CONTRACTOR shall prepare and submit a Site Health and Safety Plan (SHSP) to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S CONSTRUCTION MANAGER. CONTRACTOR shall be responsible for the safety and health of its staff and that of its Subcontractors. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S CONSTRUCTION MANAGER will not be responsible for approving CONTRACTOR'S SHSP. HACIENDA LA PUENTE UNIFIED DISTRICT and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S CONSTRUCTION MANAGER shall be notified in writing and consulted before any changes to SHSP are implemented. CONTRACTOR shall include at a minimum the items described in the following paragraphs.

G. Key Personnel:

1. CONTRACTOR shall designate an onsite health and safety representative (HSR) who will be responsible for the compliance to the HASP including, but not limited to the following activities:

    a. Monitor workers' breathing zone and periodically at the Site for combustible gases, dusts, asbestos.

    b. Oversee all operations at the Site.

    c. Maintain proper medical surveillance.

d. Provide hazard communications to personnel at the Site.

e. Train personnel in safe operating procedures.

H. Health Risk Analysis: CONTRACTOR shall develop a health risk analysis to include all hazards which may be encountered during the project.

1. Training Requirements:

a. General: CONTRACTOR shall provide training for personnel, including supervisors, observers, and workers active on the Site. Training in safety precautions, procedures, and personal protective equipment shall comply with at a minimum, but not be limited to:

1) 29 CFR 1910.120 (e) - Hazardous Waste Operations and Emergency Response-Training.

2) 29 CFR 1910.146 - Permit-required confined spaces.

3) 29 CFR 1910.1200 - Hazard communication.

4) 29 CFR 1910.1001 - Asbestos

5) 29 CFR 1926 - OSHA Standards for the Construction Industry

6) 29 CFR 1926.59 - OSHA Hazard Communication Standard for Construction Industry

7) Any other requirements not listed to conduct the work in accordance with all Applicable Laws and Regulations.

b. Health and Safety Training: Prior to commencement of Work activities, health and safety training shall be conducted by the HSR to review pertinent sections of the HASP.

1) All workers shall attend.

2) Personnel not attending shall be given a similar pre-Work orientation individually or in groups by the HSR.

3) If a significant change in on-Site operations occurs during Work activities, another Site-specific training session shall be given.

4) A record of training and attendance shall be provided in the Project safety log.

c. Training Certification: CONTRACTOR shall submit copies of current training certifications for all Project personnel to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S CONSTRUCTION MANAGER prior to entry onto the Work Site.

d. Site Visitors: A visitor seeking entry into an exclusion zone or contamination reduction zone on Site shall present documents of current health and safety training and medical surveillance examination/certification equivalent to that required for on-Site Work. HSR shall provide orientation on relevant sections of the HASP.

1) Personal Protective Equipment:

a) CONTRACTOR shall include in SHSP all personal protective equipment (PPE) anticipated for use on Site according to level of protection indicated by health risk analysis.

b) Level 3 with high visibility safety vest shall be the minimum level of protection set for Site operations.

2) Site Security and Control:

a) Include procedures for Site security and control in SHSP.

b) Indicate Site exclusion and contamination reduction zone boundaries in SHSP.

c) Provide register log form for entering and leaving the Site.

3) Contingency Plan:

a) SHSP shall include a contingency plan for health and safety emergencies.

b) This plan shall incorporate any Site-specific or HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT-specific requirements.

c) A copy of the contingency plan shall remain on-Site, signed by and available for review by all personnel.

4) Standard Operating Procedures:

a) CONTRACTOR shall be familiar with and include in SHSP the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S standard operating procedures (SOP) relevant to Work activities performed on Site.

PART 2 - PRODUCTS

2.01 PERSONAL PROTECTIVE EQUIPMENT

A. Level of Protection. CONTRACTOR shall include in SHSP all personal protective equipment (PPE) anticipated for use on Site.

1. Protection: Work activities shall be conducted with a minimum safety equipment indicated below. CONTRACTOR is responsible for identification and providing additional protective equipment as deemed necessary based on the identified hazards at the site. Protection shall at a minimum consist of:

a. Work boots with steel toe and steel shank.
b. Hard hat.
c. Safety glasses
d. Safety vest

2.02 FIRST AID PROVISIONS AND EMERGENCY EQUIPMENT

A. Fire Extinguishers: Type and number of fire extinguishers shall be determined by CONTRACTOR in accordance with Applicable Laws and regulations and submitted as part of the HASP. Inspection and maintenance shall be the responsibility of CONTRACTOR. Other fire stations equipped with the appropriate type and size of fire extinguishers shall be established by CONTRACTOR as needed. These stations shall be clearly marked and identified in the HASP. All combustible or flammable materials used onsite shall be stored in Underwriter's Laboratory (UL) listed and/or Factory Mutual (FM) approved containers.

B. CONTRACTOR shall arrange for local emergency rescue support (i.e. local fire department) or provide any and all emergency rescue equipment, such as safety harness and lifeline, and/or basket stretcher that is required to rescue an individual from an excavation cave-in and/or confined space.

PART 3 - EXECUTION

3.02 SITE SECURITY AND CONTROL

A. Work Zones:

1. An exclusion zone for Work activities shall be established by the HSR.

2. Both zones shall be clearly delineated with the use of barrier tape or snow fencing.

3. CONTRACTOR'S Site office, parking area, and other support operations shall be located outside the exclusion zone.

4. Any changes in the exclusion zone shall be presented in a written HASP amendment by the HSR to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S CONSTRUCTION MANAGER for approval.

5. Boundaries of the exclusion and contaminated reduction zones shall be clearly posted by CONTRACTOR.

B. Site Register: CONTRACTOR shall maintain a register of all personnel visiting, entering, or working (on the Site) (in the exclusion zone).

C. CONTRACTOR is responsible for securing Work Zone and Site office with a temporary fence from trespassers.

D. CONTRACTOR shall coordinate with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S CONSTRUCTION MANAGER to provide access as necessary for parties involved in other projects on the site, if any.

E. Signs: Before Site operations begin, CONTRACTOR shall post signs at the perimeter of the exclusion zone stating:

DEMOLITION AREA - KEEP OUT DANGER - NO SMOKING AUTHORIZED PERSONNEL ONLY

1. Signs shall be printed in bold large letters on contrasting backgrounds.

2. Signs shall be visible from all points, where entry might occur and at such distances from the restricted area that personnel may read the signs and take necessary protective steps before entering.

3.02 CONTINGENCY PLAN

A. The following part of the SHSP shall be posted in Site construction office trailers, kept in all Site vehicles, and provided to supervisory personnel on Site.

1. Emergency Action - Standard Operating Procedures:

a. Name, address, and telephone number of the nearest medical treatment facility shall be conspicuously posted. A map and direction for locating the facility, plus the travel time, shall be readily available.

b. If the facility lacks toxicological capability, arrangements shall be made for consultant services.

c. Arrangements to quickly obtain ambulance, emergency, fire, and police services. Telephone numbers and procedures for obtaining these services shall be conspicuously posted.

d. Prior to mobilization at the Site, personal contact shall be made with emergency room personnel, the poison control center, and the local fire department and police. If outside of an established town, contact shall be made with county officials and local emergency services.

e. An eye wash kit and first aid equipment shall be readily available on Site. Personnel shall have first aid and medical emergency training.

f. Sufficient water and/or dry chemical fire extinguisher and neutralizing agents shall be maintained on Site to cope with any situation until emergency services can arrive.

1) Medical Emergencies

a) For any person who becomes ill or injured on Site and the injury or illness is minor, follow the requirements of the Site Health & Safety Plan.

b) The SHSP shall outline how decontamination will occur should a medical emergency arise in the containment area.

2) Site-Specific Information. The following shall be provided on a Site- specific basis:

a) Nearest Hospital:

Name.
Address.
Phone number.
Directions from the Site (map attached).

b) Nearest Fire Department:

Phone number.

c) Facility Contact:

Phone number.

d) Other emergency contacts.

3.03 CONFINED SPACE

A. Confined Space: As part of the SHSP, CONTRACTOR shall identify all tasks that shall be considered confined space entry (e.g., entrance into manholes, buildings, and trenches), any procedure for entry into these spaces (i.e., air testing), and permit requirements.

END OF SECTION

SECTION 01 35 60

SITE SECURITY PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. This section describes the minimum-security measures to be taken and equipment to be used by the CONTRACTOR for the Site.

B. The CONTRACTOR shall be responsible for maintaining security of the Site as identified in the Project Plans twenty-four (24) hours a day, seven (7) days a week, including holidays, throughout the duration of the Contract.

C. CONTRACTOR shall have sole responsibility for job site security. CONTRACTOR shall protect the Work from theft, vandalism, and unauthorized entry.

D. CONTRACTOR shall employ and maintain sufficient safety measures to effectively prevent vandalism, vagrancy, theft, arson, and all other such negative impacts to the Work. Any impacts to the progress of the Work of CONTRACTOR, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, or HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S forces, due to loss, will be the responsibility of CONTRACTOR.

E. The CONTRACTOR shall make no claim against HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT consultants for damage resulting from theft, vandalism, unlawful, and unauthorized entry onto the site.

F. The CONTRACTOR and its Security Services firm shall replace, repair, restore, and make good all damage to property of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and others resulting from failure of securing the site.

G. Until Completion of the Work, CONTRACTOR shall employ appropriate means to remove all graffiti from buildings, equipment, fences, and all other temporary and/or permanent improvements on the Project site within twenty-four (24) hours from the date of report or forty-eight (48) hours of each occurrence.

H. If existing fencing or barriers are breached or removed for purposes of construction, the CONTRACTOR shall provide and maintain temporary security fencing in a manner satisfactory to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

I. CONTRACTOR shall maintain security throughout construction until the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT occupancy or acceptance.

J. The CONTRACTOR shall restrict entrance of persons and vehicles into the Site and existing facilities. The CONTRACTOR shall allow entrance only to authorized persons with proper identification.

K. Protect Work, existing premises and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT operations from theft, vandalism, and unauthorized entry.

L. Penal Code Sections 290 and 290.4 commonly known as "Megan's Law", require, among other things, individuals convicted of sexually oriented crimes, to register with the chief of police where the convicted individual resides or with a county sheriff or other law enforcement officials. CONTRACTOR shall check its own employees and require each Subcontractor to check its employees and report to CONTRACTOR if any such employees are registered sex offenders. CONTRACTOR shall check monthly during the life of the

Contract to ascertain this information and report same to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Before starting the Work, and monthly thereafter during the life of Contract, CONTRACTOR shall notify HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT in writing if any of its employees and/or if any Subcontractor's employee is a registered sex offender.

1.02 RELATED SECTIONS

A. Section 01 50 00 Construction Facilities Temporary Controls.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 SECURITY PLAN

A. The CONTRACTOR shall submit a site security plan. This plan shall address at a minimum, the following:

1. Description of proposed daily security operations.

2. Method and frequency for conducting security checks.

3. Sign in/sign out procedures.

4. Location of security station (if implemented).

5. Description of how a breach of security shall be handled. A breach of security shall include, but not be limited to, unauthorized personnel located in the active Site work areas, unauthorized personnel attempting to gain access to the active Site work areas, broken fences and unlocked gates, and unauthorized access to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT work areas.

6. Location of security check points.

7. Security cameras. At a minimum, the contractor must locate motion triggered security cameras at the following locations: entry and exit gates, site perimeter, office trailer(s), equipment trailer(s) and material storage area(s).

8. Location of security lighting. Lights triggered by motion detection or passive infrared sensor are required. At a minimum, provide lights surrounding the following locations at Office trailer, equipment storage trailer, material storage yard, equipment storage areas, entry and exit gates, site temporary roads, and around the perimeter of the site.

9. Lighting should be illuminated to a minimum consistent with applicable local regulations and should be visible from the traveled roads bordering the construction site.

10. Communications: On-site security personnel shall contact HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT local police if they witness crime in progress.

11. List of personnel to be contacted in case of emergency.

3.02 SITE SECURITY

A. Trailers shall be alarmed to provide security during periods of inactivity (nights, weekends, Holidays, etc.).

B. The CONTRACTOR shall provide keyed locks on all fence gates. The CONTRACTOR shall provide motion lights at each gate, at all trailers (where access is possible, i.e., doors and windows), and at all equipment storage areas.

C. The CONTRACTOR shall ensure that all gaps in fences are closed to provide security of the active work areas.

D. The CONTRACTOR shall be responsible for maintaining a log of all security incidents. This log shall be furnished to the HACIENDA LA PUENTE UNIFIED DISTRICT'S CONSTRUCTION MANAGER upon request.

3.03 ENTRANCE CONTROL

A. Control of all persons, equipment, and vehicles entering and leaving the Site shall be provided by the CONTRACTOR. CONTRACTOR SHALL BE REQUIRED TO MAINTAIN WORK AREA SITE SECURITY.

B. The CONTRACTOR shall require each person to display proper identification and credentials. If person does not have the proper credentials, he/she must be escorted by a person carrying the proper credentials.

C. The CONTRACTOR shall maintain a list of persons authorized for Site entry and submit a copy of the list to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S CONSTRUCTION MANAGER.

D. Implements procedures to deny unauthorized site access. The CONTRACTOR shall require all personnel and visitors having access to the Site to sign in and sign out and shall keep a record of all Site access. A log of all visitors shall be maintained.

E. Site visitors shall not be permitted to enter active work areas unless authorized by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S CONSTRUCTION MANAGER or Site Health and Safety Officer.

F. Vehicular access shall be restricted to authorized vehicles only.

G. Personal vehicles shall not be authorized to enter the on-site active work areas.

H. All Site activities, visitations, etc. shall be coordinated with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT on a daily basis. At a minimum, records of visitors and trucks entering/leaving the Site shall be provided upon request.

I. Restrict the access of all persons entering the construction area to the agreed upon access route and to the actual site of the Work.

J. Restrict activities of workers to authorized areas. Workers shall not mingle in student or public areas.

K. Provide HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT with keys to all construction gates and building entrances.

L. Post project contact list, to include 24-hour telephone numbers, for all key project staff members. Post list at major access points to the project site(s) and outside at the project office. Update as necessary.

M. Post warning signs to help keep unauthorized persons off the site.

N. Provide nighttime lighting of the site.

O. Consider limiting vehicle access to the site to one designated entrance through which all vehicle traffic.

P. Inspect the site at the end of each day before securing it to assure nothing has been compromised.

3.04 SECURITY STATION

A. The CONTRACTOR is required to provide an area designated for security operations. This area may be part of CONTRACTOR'S offices.

END OF SECTION

SECTION 01 41 10

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Construction Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Contract General Conditions and Supplementary General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 AUTHORITY AND PRECEDENCE OF CODES, ORDINANCES, AND STANDARDS

A. Authority: All codes, ordinances and standards referenced in the Drawings and Specifications shall have the full force and effect as though printed in their entirety in the Specifications.

B. Precedence:

1. Where specified requirements differ from the requirements of applicable codes, ordinances and standards, the more stringent requirements shall take precedence.

2. Where the Drawings or Specifications require or describe products or execution of better quality, higher standard or greater size than required by applicable codes, ordinances and standards, the Drawings and Specifications shall take precedence so long as such increase is legal.

3. Where no requirements are identified in the Drawings or Specifications, comply with all requirements of applicable codes, ordinances and standards of authorities having jurisdiction.

C. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT OBLIGATIONS

1. Neither HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT nor ARCHITECT are responsible for monitoring CONTRACTOR'S compliance with codes, laws, or other Regulatory Requirements.

2. Reviews performed or failed to be performed by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, ARCHITECT, and other consultants under employment by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT do not waive or change CONTRACTOR'S obligations, and do not constitute approval of the Work or portions of the Work.

D. CONTRACTOR REQUIREMENTS

1. Perform Work in accordance with requirements of governing agencies and other Regulatory Requirements; including Regulatory Requirements referenced by this Section and other Contract Documents.

2. Schedule and coordinate inspections and gain approvals required by governing agencies in timely manner, as necessary for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT occupancy of site within Contract Time.

3. Inform Building Department, Fire Department, and other governing agencies in timely manner of changes in the Work affecting Regulatory Requirements.

4. Promptly forward to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, inspections, reports, orders, permits, and other directives and correspondence received from inspector or governing agency having jurisdiction over the Work.

5. Promptly notify HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT where Contract Documents appear to conflict with Regulatory Requirements.

E. REGULATORY REQUIREMENTS

1. Regulatory Authorities establish minimum requirement levels. Where provisions of Contract Documents and Regulatory Requirements differ or conflict, more stringent requirements govern.

2. Regulatory Requirements added by other Sections or by Addendum apply to requirements of this Section.

3. Regulatory Requirements, current at date of Building Permit Submittal and as required by governing agencies, supersede, and govern over those listed by this Section and other Contract Documents.

1.03 APPLICABLE CODES, LAWS, AND ORDINANCES

A. Applicable Codes, Laws, and Ordinances: Refer also to Section 01 11 00 - Summary of the Work regarding permits and licenses.

1. Performance of the Work shall meet or exceed the minimum requirements of the latest revisions of the California Code of Regulations (CCR), Title 24, including, but not limited to, the following:

a. CCR Title 24, Part 1: California Building Standards Administrative Code.

b. CCR Title 24, Part 2: California Building Code (CBC), consisting of Uniform Building Code (UBC) Volumes 1 through 3, with State of California Amendments.

c. CCR Title 24, Part 3: California Electrical Code (CEC); consisting of National Fire Protection Association (NFPA) 70 - National Electrical Code (NEC), with State of California Amendments.

d. CCR Title 24, Part 4: California Mechanical Code (CMC); consisting of Uniform Mechanical Code (UMC) with State of California Amendments.

e. CCR Title 24, Part 5: California Plumbing Code (CPC); consisting of Uniform Plumbing Code (UPC) with State of California Amendments.

f. CCR Title 24, Part 6 California Energy Code.

g. CCR Title 24, Part 9: California Fire Code (CFC); consisting of Uniform Fire Code (UFC) with current State of California Amendments.

h. CCR Title 24, Part 10 California Existing Building Code.

i. CCR Title 24 Part 11 California Green Building Standards (CALGreen Code).

j. CCR Title 24, Part 12: California Reference Standards Code; consisting of Uniform Building Code Standards (UBC Standards) with State of California Amendments.

2. Performance of the Work shall also comply with applicable requirements of California Code of Regulations (CCR) as follows:

   a. Title 19 - Public Safety.

   b. Title 22 - Social Security.

3. References on the Drawings or in the Specifications to "code", "Code" or "building code" similar terms, not otherwise identified, shall mean the codes specified above, together with all additions, amendments, changes, and interpretations adopted by code authorities of the jurisdiction having authority over the Project.

4. The applicable edition of all codes shall be that adopted at the time of issuance of permits by the authority having jurisdiction and shall include all modifications and additions adopted by that authority. The applicable date of laws and ordinances shall be that of the date of performance of the Work.

B. Other Applicable Laws, Ordinances, and Regulations:

1. Work shall be accomplished in conformance with all applicable laws, ordinances, rules, and regulations of Federal, State, County, City. and special agencies and jurisdictions having authority over the Project.

2. Performance of the Work shall be accomplished in conformance with all rules and regulations of public utilities, utility districts, and other agencies serving the facility.

3. Where such laws, ordinances, rules, and regulations require more care or greater time to accomplish Work, or require better quality, higher standards or greater size of products, Work shall be accomplished in conformance to such requirements with no change to the Contract Time and Contract Sum, except where changes in laws, ordinances, rules, and regulations occur subsequent to the execution date of the Agreement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 42 13

ABBREVIATIONS SYMBOLS and ACRONYMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. List of abbreviations, symbols, and acronyms of societies, institutes, and associations generally appearing in the Contract Documents.

1.02 RELATED REQUIREMENTS

A. Division 01 - General Requirements

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 ABBREVIATIONS

ac	Alternating current
amp	ampere
C	Degrees Centigrade, Celsius
Cat 6	Category 6, unshielded twisted pair cabling
CFC	Chlorofluorocarbon
cfh	Cubic feet per hour
cfm	Cubic feet per minute
cm	Centimeter
Co.	Company
Corp.	Corporation
d	Penny
db.	Decibel
DB	Dry bulb
dc	Direct current
ePTZ	Digital Pan Tilt Zoom
F	Degrees Fahrenheit
fpm	Feet per minute
FPS	Frames per Second
ft	Foot or feet
GA	Gage
gph	Gallons per hour
gpm	Gallons per minute
HP	Horsepower
Hz	Hertz
ID	Inside Diameter
Inc.	Incorporated
IP	Internet Protocols
IR light	Infrared light
Kbps	Kilobits per Second
KHz	Kilohertz
Kip	thousand pounds
Ksf	Thousand pounds per square foot
Ksi	Thousand pounds per square inch
Kv	Kilovolt
KVA	Kilovolt amperes
KW	Kilowatt
KWH	Kilowatt hour

LED	Light Emitting Diode
LF	Linear foot
Lb(s)	Pound(s)
LCD	Liquid Crystal Display
Lux	A standard unit of illumination measurement
Max	Maximum
MBH	1000 BTUs per hour
MHz	Mega hertz
mil	Thousandth of an inch
Min	Minimum
mm	Millimeter
mph	Miles per hour
NA	Not Applicable
NIC	Not in Contract
OC	On Center
OD	Outside Dimension
oz.	Ounce
PCF	Pounds per cubic foot
pH	Acidity-alkalinity balance
PoE	Power Over Ethernet - A standard for providing power over network cable
psf	Pounds per square foot
psi	Pounds per square inch
psig	Pounds per square inch, gage
PTS	Pan–Tilt–Zoom
PVC	Polyvinylchloride
QoS	Quality of Service
RF	Radio frequency
rpm	Revolutions per minute
SDK	Software Development Kit
SF	Square foot
SIP	Session Initiation Protocol
SMA	Software Maintenance Agreement
SS	Stainless Steel
SSL	Secure Sockets Layer
SSM	Server Software Module
SY	Square yard
TCP	Transmission Control Protocol
TLS	Transport Layer Security
UI	User Interface
Unicast	Communication between a single sender and single receiver on network
UPnP	Universal Plug and Play
V	Volts
VBR	Variable Bit Rate
VMS	Video Management System
W	Watts
WB	Wet bulb
WDR	Wide dynamic range

3.02 SYMBOLS

#	Number or pound
'	Foot or feet
"	Inch(es)
%	Percent
◦	Degree (Angle or Temperature)

3.03 ACRONYMS

AA	The Aluminum Association, Inc
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABMA	American Boiler Manufacturers Association
ACI	American Concrete Institute
ACS	Access Control System
AEC	Automatic Echo Cancellation
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
AFF	Above Finish Floor
AGC	Automatic Gain Control
ALPR	License Plate Recognition
AGA	American Gas Association
AGC	Automatic Gain Control
AGCIH	American Conference of Governmental Industrial Hygienists
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association, Inc.
ANI	Automatic Number Identification
ANSI	American National Standards Institute
APA	APA – The Engineered Wood Association
API	Application Programming Interface
ARI	Air-Conditioning and Refrigeration Institute
ARS	Automated Route Selection
ARP	Address Resolution Protocol
ATSC	Advanced Television Systems Committee
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATBCB	Architectural & Transportation Barriers Compliance Board
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BBS	Backbone Switch
BGP	Border Gateway Protocol
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America
BICSI	Building Industry Consulting Services, International
BRI	Basic Rate Interface
BOOTP	Bootstrap Protocol
BTU	British thermal unit
CAL/OSHA	California Occupational Safety and Health Administration
CAC	Call Admission Control
CAS	Channel Associated Signaling
CAT 5e	Category 5e
CBC	California Building Code
HLPUSD	HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT
CCR	California Code of Regulations
CCK	Complementary Code Keying
CDR	Call Detail Record
CEC	California Electrical Code

CESM	Compact Edge Switch-Managed
CFR	Code of Federal Regulations
CIF	Common Intermediate Format
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CLI	Command Line Interface
CLID	Calling Line Identification
CMAS	California Multiple Award Schedule
CMC	California Mechanical Code
CNG	Comfort Noise Generation
CNID	Calling Party Name Identification
CQC	California Quality Control (CMA Standards)
Codec	Coder/Decoder
COP	Coefficient of performance
COS	Class of Service
CPC	California Plumbing Code
CRA	California Redwood Association
CSA	Client Software Application
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards, U.S. Department of Commerce
CS	Communications Server
CSFM	California State Fire Marshal
CSI	Construction Specifications Institute
CTIOA	Ceramic Tile Institute of America
CTI	Cooling Tower Institute
DHCP	Dynamic Host Configuration Protocol
DHI	Door and Hardware Institute
DHCP	Dynamic Host Configuration Protocol
DGM	Dynamic Graphical Map
DNS	Domain Name System
DSS	Direct Station Selection
DTMF	Dual Tone Multiple Frequency
DVD	Digital Video Disc
EER	Energy efficiency ratio
EIA	Electronic Industries Alliance
EIS	Electronic Image Stabilization
ESM	Edge Switch-Managed
E&M	Ear and Mouth
FAT	Field Acceptance Testing
FEP	Front End Processor
FEP	Fluorinated Ethylene Propylene
FPS	Frames per Second
FTP	File Transfer Protocol
FXS	Foreign Exchange Station
EPA	Environmental Protection Agency
ETL	ETL Testing Laboratories
FCC	Federal Communication Commission
FDA	Food and Drug Administration
FECC	Far End Camera Control
FPS	Frames per Second
FM	Factory Mutual
FPS	Frames per Second
FS	Federal Specifications
FTP	File Transfer Protocol
FXO	Foreign Exchange Office
FXS	Foreign Exchange Station
GA	Gypsum Association
GANA	Glass Association of North America
GBIC	Gigabit Interface Converter

GUI	Graphical User Interface
GigE	Gigabit Ethernet
HMMA	Hollow Metal Manufacturer's Association
HPVA	Hardwood Plywood & Veneer Association
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol over SSL
HVAC	Heating, Ventilation, and Air Conditioning
IACS	International Annealed Copper Standards
IAMPO	International Association of Plumbing and Mechanical Officials
IC	Intercom
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association
ICMP	Internet Control and Message Protocol
ID	Identifier
IDF	Intermediate Distribution Frame
IEEE	Institute of Electrical & Electronic Engineers, Inc.
IDS	Intrusion Detection System
IEC	International Electro technical Commission
IES	Illuminating Engineering Society
IMI	International Masonry Institute
IOR	Inspector of Record
IP	Internet Protocol
IP Router	Internet Protocol Router
IPVC	Internet Protocol Video Conferencing
IPX	Internetwork Packet Exchange
IRI	Industrial Risk Insurers
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ISA	Industry Standard Architecture
ISDN	Integrated Services Digital Network
ISM	Intermediate Switch-Managed (Fiber Switch)
ISMS	Integrated Security Monitoring and Management System
ISP	Internet Service Provider
ITU	International Telecommunication Union
IVR	Interactive Voice Response
JPEG	Joint Photographic Experts Group (image format)
Kbps	Kilobits per Second
LAN	Local Area Network
LCD	Liquid Crystal Display
LDC	Local Distribution - Cabinet
LDF	Local Distribution Frame
LED	Light Emitting Diode
LIU	Light Interconnection Unit
MAC	Media Access Control
MAN	Metropolitan Area Network
MBR	Maximum Bit Rate
MCU	Multipoint Conference Unit
MDF	Main Distribution Frame
MDF-BBS	Main Distribution Frame Backbone Switch
MIB	Management Information Base
MIC	Message Integrity Check
MLD	Multicast Listener Discovery
MLSFA	Metal Lath/Steel Framing Association
MPOE	Main Point of Entry
MPEG	Moving Picture Experts Group
MP-BGP	Multi-Protocol Border Gateway Protocol
MOS	Mean Opinion Scale
MSS	Manufacturers Standardization Society of the Valve & Fittings Industry.
NAAMM	National Association of Architectural Metal Manufacturers
NAT	Network Address Translation

NAT-PT	NAT Protocol Translation
NAS	Network Attached Storage
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NEBB	National Environmental Balancing Bureau
NEBS	Network Equipment Building System
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NEC	National Electrical Code
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NIC	Network Interface Card
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NMP	Simple Network Management Protocol
NOFMA	National Oak Flooring Manufacturers Association
NPCA	National Paint and Coatings Association
NPDES	National Polluant Discharge Elimination System
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NTP	Network Time Protocol
NTSC	National Television System Committee
NTMA	National Terrazzo & Mosaic Association
NTSC	National Television System Committee
NUSIG	National Uniform Seismic Installation Guidelines
NWMA	National Woodwork Manufacturers Association
OC-3	Optical Carrier Level-3 (~155 Mbps)
OEHS	Office of Environmental Health and Safety (HLPUSD's)
OFNR	Optical Fiber Non-Conductive Riser
OFNP	Optical Fiber Non-Conductive Plenum
OID	Object Identifier
OPX	Off Premise Extension
OSHA	Occupational Safety & Health Administrations
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First
OTDR	Optical Time Domain Reflectometer.
ONVIF	Open Video Interface Forum
PA	Public Address
PABX	Private Auxiliary Branch Exchange
PA/IC	Public Address/Intercommunications
PAL	Phase Alternating Line
PAT	Port Address Translation
PBX	Private Branch Exchange
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PCM	Pulse Code Modulation
PDI	Plumbing and Drainage Institute
PEI	Porcelain Enamel Institute
PHB	Per Hop Behavior (DiffServ)
PIC	PBX Integration Card
PIM	Protocol-Independent Multicast
PING	Packet Internet Groper
PINX	Private Integrated Services Network Exchange
PIP	Picture in Picture
PMO	Project Management Office
PoE	Power-over-Ethernet
POP	Point of Presence
POTS	Plain Old Telephone System
PRI	Primary Rate Interface

PS	Product Standard, U.S. Department of Commerce
PSIP	Program and System Information Protocol
PSTN	Public Switched Telephone Network
PZM	Pressure Zone Microphone
QCIF	Quarter CIF - See CIF
QoS	Quality of Service
QSIG	Q-Signaling
RADIUS	Remote Access Dial-In User Service
RIP	Routing Information Protocol
RIPng	Routing Information Protocol Next Generation
RIS	Redwood Inspection Service
RMON	Remote Network Monitoring
RMON2	Remote Network Monitoring Version 2
SAN	Storage Area Network
SCAQMD	South Coast Air Quality Management District
SCSI	Small Computer System Interface
SDEI	Steel Deck Institute
SDI	Steel Door Institute
SFM	State Fire Marshal
SFP	Small Form-factor Pluggable transceiver
SFP+	Enhanced Small Form-factor Pluggable transceiver
SFPA	Southern Forest Products Association
SIF	Source input format (NTSC)
SIP	Session Initiation Protocol
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SLC	Small Learning Community
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SMDI	Simple Message Desk Interface
SMI	Structure of Management Information
SMTP	Simple Mail Transfer Protocol
SMPTE	Society of Motion Picture and Television Engineers
SNA	Systems Network Architecture
SNMP	Simple Network Management Protocol
SSH	Secure Shell
SSID	Service Set Identifier
SSL	Secure Socket Layer
SSPC	Steel Structures Painting Council
S/P DIF	Sony/Philips Digital InterFace
SWI	Steel Window Institute
TEHO	Tail End Hop Off
TCA	Tile Council of America
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
TIA	Telecommunications Industry Association
TKIP	Temporal Key Integrity Protocol
TLS	Transport Layer Security
TOS	Type of Service
UBPPA	Uni-Bell PVC Pipe Association
UCI	Uniform Construction Index
UFAS	Uniform Federal Accessibility Standards
UL	Underwriters' Laboratories, Inc.
UM	Unified Messaging
UPS	Uninterruptible Power Supply
UPnP	Universal Plug and Play
URL	Uniform Resource Locator
USDA	United State Department of Agriculture
UTC	Coordinated Universal Time
UTP	Unshielded Twisted Pair
UPS	Uninterruptible Power Supply

USP	Unified Security Platform
USW	Unified Web Client
VAD	Voice Activity Detection
VBR	Variable Bit Rate
VLAN	Virtual Local Area Network
VM	Voice Mail
VSS	Video Surveillance System
VoD	Video on Demand
VFD	Vacuum Fluorescent Display
VTC	Video Teleconference
WAN	Wide Area Network
WDR	Wide dynamic range
WLAN	Wireless Local Area Network
WCLIB	West Coast Lumber Inspection Bureau
WDMA	Window and Door Manufacturers Association
WWPA	Western Wood Products Association

END OF SECTION

SECTION 01 42 16

DEFINITIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Definitions of words used by Project Manual.
B. Format and language used by Project Manual.

1.02 ADDITIONAL DEFINITIONS

A. As defined by Conditions of the Contract.
B. Definitions specified by individual Sections of Project Manual.

1.03 DEFINITIONS OF WORDS USED BY PROJECT MANUAL

A. “Approved” and “accepted”: Means “consented to by ARCHITECT or OWNER in so far as item or action meets or exceeds requirements of Contract Documents”. In no case will “approved” or “accepted” be interpreted as assurance to CONTRACTOR that requirements of the Contract Documents have been fulfilled.

B. “For approval” and “as accepted”: Means, “for formal consent by OWNER, ARCHITECT, or Consultant”.

C. “Or approved”, “as approved”, “or accepted”, “as accepted”: Means, “consented to in so far as accepted item or action meets or exceeds requirements of Contract Documents”. Where used, ARCHITECT and OWNER are sole judge of quality and suitability.

D. “Selected”: Means, “as selected by ARCHITECT”. It is not necessarily limited to manufacturer's standard line of colors, finishes or details, unless otherwise called for.

E. “As instructed”: Means, “as instructed by ARCHITECT”.

F. “As required”, “as needed”, “as necessary”: Means “As required to suitably complete the Work” and “at the direction of the ARCHITECT”.

G. “Furnish” and “supply”: Means, “arrange, purchase, and deliver to site ready for intended inclusion into the Work”. “Furnish” and “Supply” may be used interchangeably.

H. “Install”: Means, “to place in position for service or use”, to hook up to utilities or to secure into place.

I. “Provide”: Means, “furnish, and install complete, in place, ready for intended operation and use.”

J. “Verify”: Means “to determine the condition of existing elements at the project prior to beginning work”.

K. “Shown”: Means, “where reasonably implied by Drawings of the Contract Documents.”

L. “Specified”: Means “where reasonably implied by Project Manual”.

M. “Indicated”: Means, “where reasonably implied and necessary in conformance with work specified, drawn, or required for completion, including written information and drawings of Contract Documents”.

N. “Coordinate”: Means “coordinate scheduling, submittals, work of Project Manual, Drawings, work of subcontractors, suppliers, and other means and methods as necessary for efficient, sequential, and orderly construction progress.”

O. “Product”: Means, “materials, equipment, and other items provided by CONTRACTOR, covered under Part 2 of each Section”.

P. “Project Manual”: Written portions of Contract Documents, as listed in the Table of Contents, including but not limited to Bidding Requirements, Contracting Requirements, Division 1- General Requirements, and specification Sections under Division 2 through Division 33.

Q. “Drawings”: As listed in Index to Drawings and other drafted, sketched, or pictorial illustrations included in the Contract Documents.

R. “Work”: Means, "construction, installations, applications, demolitions, and other operations as indicated or implied by the Contract Documents". Refers to work of individual Sections for complete and finished systems, and Work to fully complete requirements of the Contract Documents for Project completion as a whole.

S. “Installer”, “Erector”, and “Applicator”: Means, “person or entity engaged by CONTRACTOR, subcontractor, or sub-subcontractor for performance of work indicated by Contract Documents, such as installation, erection, or application of specified products and systems”.

T. “Specialist”: Means, “person, firm, or entity of established reputation (or if newly organized, whose personnel have previously established a reputation in the same field), regularly engaged in and maintaining an experienced force of skilled workers qualified to perform items of work required by Construction Documents, such as in manufacturing, fabricating, installing, and applying specified products and systems.

U. “Manufacturer's Instructions”: Means, “manufacturer’s written or verbal directions or recommendations, specifications, product literature, and product data as required to complete work in accordance to manufacturer's system”.

1. Unless otherwise noted or instructed, install work in accordance with manufacturer's instructions for best results. Do not omit preparatory steps or installation procedure unless specifically modified or exempted by Contract Documents or approved by ARCHITECT.

2. Where more than one manufacturer is involved in the work or its component parts, follow requirements that are more stringent by each manufacturer as required to properly complete work. Submit discrepancies or conflicts to ARCHITECT for resolution.

3. Install work in accordance with manufacturer's instructions even where not specifically stated by Contract Documents. Where Contract Documents conflict with manufacturer's instructions, notify ARCHITECT for resolution. Do not proceed until written authorization is received.

V. “Project Site”: Means, “the space made available to CONTRACTOR for performing construction activities in performing Work of this Project”. The extent of the Project Site is shown on the Drawings.

W. “Regulatory Requirements”: Means, “codes, laws, statutes, and lawful orders established by governing agencies and other regulatory authorities having jurisdiction over the work as well as rules, conventions, and agreements within the construction industry that controls work performance”.

X. “Days” Means “calendar days” unless otherwise indicated.

1.04 FORMAT USED BY PROJECT MANUAL

A. “Project Manual Organization”: Organization is according to Construction Specification Institute (CSI), Project Resource Manual and Master Format 2014.

1. This includes Divisions of related construction information and Sections defining portions of each Division.

2. Divisions and Sections do not define limits of work for each trade.

3. Sections are not intended to define contractual relationships, such as between CONTRACTOR, subcontractors, suppliers, and manufacturers.

4. Therefore, one (1) or more trades may perform work of a single Section and a particular trade may perform work of more than one Section.

B. “Document and Section Format”: Based upon CSI Master Format, Section Format, and Page Format, organization, titles, and numbering system.

1.05 LANGUAGE USED BY PROJECT MANUAL

A. Singular and Plural: Product referenced, whether as singular or as plural in number, are to be taken to mean as many such Products and systems as required to complete the Work. Singular means plural and plural means singular.

B. Tense: Present tense words include future tense.

C. Gender: Words in masculine gender include feminine and neuter genders.

D. All, each, any, every, (etc): These and similar words are generally omitted, and their meaning is implied. Read implications of these words into requirements of phrases such as, “Balance and adjust [all] dampers”.

E. Specifying by Reference: Comply with provisions of Section 014219 for products specified by Reference Standards. Conform to most current revised requirements at time of Bid.

F. Streamlined Language: Language is abbreviated or streamlined and includes short imperative phrases in place of complete sentences.

G. Words and phrases such as “shall”, “the CONTRACTOR shall”, and “shall be”, are generally omitted and are to be inferred.

H. Information is directed to CONTRACTOR, except where specifically stated otherwise.

I. Where “CONTRACTOR” is used it means CONTRACTOR as defined by the Agreement between OWNER and CONTRACTOR.

J. Where “OWNER” is used it may mean CONSTRUCTION MANAGER as defined by the Agreement between OWNER and CONTRACTOR.

K. Semicolons following Articles mean “shall be”, and “shall comply with”, and “CONTRACTOR shall.

1. Examples:

a. Flame spread: ASTM E 84, less than 20 means “Flame spread shall comply with ASTM E 84 and shall be less than 20”.

b. “Base: Pack solid with non-shrink grout.” means “CONTRACTOR shall pack base solid with non-shrink grout”.

1.06 DIMENSIONS AND MEASUREMENTS ON DRAWINGS:

A. Dimensions govern. Do not scale.

B. Check dimensions and field verify with respect to adjacent or incorporated work. Bring conflicts to ARCHITECT'S attention for interpretation and resolution.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION - (Not Used)

END OF SECTION

SECTION 01 43 00

QUALITY ASSURANCE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Quality Assurance - Control of Installation
2. CONTRACTOR'S Project Manager
3. Tolerances
4. Field Samples and Mock-ups
5. Manufacturer's Instructions
6. Field Quality Control Inspections and Testing
7. Manufacturer's Field Service and Reports
8. Certifications

1.02 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. CONTRACTOR to confirm all specification criteria is met by individual subcontractor prior to bid approval. This includes but not limited to the following:

1. Manufacturer, Fabricator, and Installer Qualifications.

B. Schedule, sequence, coordinate, and oversee, as necessary to maintain quality control for the Work and as necessary to make parts of the Work fit together within critical path as defined by Project Schedule.

C. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

D. Conform to manufacturer's instructions, Reference Standards, Regulatory Authorities, and provisions of Contract Documents to establish minimum level of quality for work of each Section.

1. Where in conflict, assume that provisions of Contract Documents prevail.

2. Verify with ARCHITECT before beginning work where other requirements are more stringent than Contract Documents.

E. Perform work by company specializing in and qualified to produce workmanship of specified quality for size and complexity of Project.

F. Maintain project superintendent continually on Project site for duration of Work of this Contract. Do not engage project superintendent in work other than Work of this Contract.

G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

H. Give persons representing or engaged by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT free, safe, and unencumbered access to the Work, and portions of the Work.

I. Give persons representing or engaged by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT access to off-site facilities where components of the Work are stored, work takes place that that will be included into or otherwise affect the Work.

J. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT reserves right to photograph, videotape, or otherwise to record through visual, audio, electronic, and written means, work- and work-related events in order to track progress and quality of the Work.

1.03 CONTRACTOR'S PROJECT MANAGER

A. Refer to Conditions of the Contract for related requirements.

B. Remain as needed on Project site during working hours until Final completion Work of this Contract. Do not engage in work other than Work of this Contract.

C. Prepare measure and payment documents including Application for Payment, modifications to the Contract, Unit Prices, and Allowances. Prepare and verify coordination with Schedule of Values specified by the Conditions of the Contract.

D. Prepare Submittal Schedule as specified Section 01 33 00 - Submittal Procedures and include Submittals with lead times within Critical Path of Progress Schedule.

E. Review Submittals for clarity, accuracy, completeness, coordination with other work, and conformance to specified requirements.

F. Verify that format, number, and other provisions conform to Section 01 33 00 - Submittal Procedures and other requirements of the Contract Documents.

G. Do not accept or forward for ARCHITECT'S review Submittals that contain product substitutions not accepted by Substitution Request.

H. Stamp and certify CONTRACTOR'S review of Submittals before submitting to ARCHITECT.

I. Prepare or direct preparation of Coordination Overlay Drawings and Masonry Coordination Drawings as specified in Section 01 31 13 - Project Coordination.

J. Coordinate and facilitate testing and inspections including State, County, City, Health, Labor, and Industries and as follow:

1. As specified by other Sections to meet Quality Assurance and Code provisions.

K. Conduct Project Closeout administrative procedures including preparation and Submittals of Operating and Maintenance Manuals, Project Record Documents, Warranties, and other closeout documents.

1.04 TOLERANCES

A. Monitor fabrication and installation tolerance to produce acceptable Work. Do not permit tolerances to accumulate.

B. Conform to specified tolerances. When manufacturers' tolerances conflict with provisions of Contract Documents, request clarification from ARCHITECT before proceeding.

C. Make adjustments to conform to specified tolerances before securing products in place.

1.05 FIELD SAMPLES AND MOCK-UPS

A. Construct specified field samples and mock-ups at designated Project location, or where instructed by ARCHITECT.

B. Provide physical field samples illustrating finishes, coatings, patterns, and systems.

C. Construct full-size mock-ups, as may be requested, for review of construction systems to establish standards by which workmanship will be judged.

D. Provide full scale field samples and mock-ups, as may be requested, with specified attachments, anchorage devices, flashings, sealants, finishes, and colors for a complete and finished system.

E. Provide in dimension as specified, or when not specified, provide in sufficient size and completeness, in consultation with ARCHITECT, to illustrate each sample.

F. Do not install as part of permanent Work, except as specified or instructed by ARCHITECT.

G. Maintain ease of access to accepted in-place mock-up. Where accepted mock-up is covered, lost, or damaged, arrange with ARCHITECT to provide new accepted mock-up as means to illustrate acceptable quality standards.

H. Demolish and remove field samples and mock-ups when instructed to do so, or if not instructed, at Project completion.

I. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings or as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

1.06 MANUFACTURERS INSTRUCTIONS

A. Conform to manufacturer's instructions in full detail, including each step-in sequence.

B. Where manufacturer's instructions conflict with provisions of Contract Documents, including Regulatory Requirements and Reference Standards, request written clarification from ARCHITECT before proceeding with work.

1.07 FIELD QUALITY CONTROL INSPECTIONS AND TESTING

A. Submit Quality Control Plan within fifteen (15) days of Notice of Award. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out the Contractor's quality-assurance and quality-control responsibilities.

B. Conduct specified field quality control testing of in-place work as required to verify conformance to specified air, water, thermal, structural, tolerances, and other performance and design requirements.

C. Conduct inspections and testing that conform to testing procedures and criteria published by specified reference standards, testing and laboratory agencies, and building codes.

D. Where initial tests fail to pass specified testing requirements, provide work needed to meet or exceed inspection and testing criteria and conduct additional testing to verify conformance.

E. Independent inspection, testing, and laboratory services may be retained by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT to conduct field quality control inspection testing services.

1. Make provisions as needed to aid testing agency in scheduling, accessing, and performing services requested by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

2. Cost of initial inspections and tests at HACIENDA LA PUENTE UNIFIED DISTRICT request will be borne by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

3. Costs of subsequent inspections and tests, needed to rectify failed initial inspection and test results, will be paid by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, and deducted from Contract Sum.

F. Independent inspection and testing services are to be certified, accredited, approved, or recognized by qualifying agencies, organizations, or institutions as specialists in conducting these services, or accepted by ARCHITECT.

1.08 MANUFACTURERS FIELD SERVICES

A. Require manufacturers to supply field services as specified and as necessary to verify conformance to manufacturer's instructions, to achieve manufacturer's warranty, and to conform to other provisions of Contract Documents and Regulatory Authorities.

B. Require manufacturer's trained and qualified personnel to inspect site conditions, surfaces, installation, quality of workmanship, start-up of equipment, testing adjusting and balancing of equipment, and other field services as necessary to maintain quality assurance of Work.

C. Require manufacturers and suppliers to provide and assist in initiating instructions when necessary.

D. For non-conforming work, submit manufacturer's written report to ARCHITECT within ten (10) days of observation. List observations and recommendations.

E. When site decisions and instructions are received, that are contrary to manufacturers' published instructions, promptly report to ARCHITECT and verify acceptance before continuing with work.

F. Manufacturer's Reports: Submit under provisions of 01 33 00 - Submittal Procedures.

1.09 CERTIFICATIONS

A. Submit two (2) copies of written certifications. Sign and date by authorized representative, officer, or other person legally entitled to represent business, firm, or organization submitting certification.

B. Provide backup data, testing procedures by independent testing agency, and other information as necessary to confirm that content of written certification meets or exceeds that required by Contract Documents.

C. Indicate conformance to, meeting or exceeding, that specified by individual Sections.

1.10 TEST DATA

A. Submit two (2) copies of test data including calculations from independent inspection agencies, testing laboratories, professional engineers, and as specified for each Section.

B. Conform to requirements of Regulatory Requirements for code related certifications.

C. Indicate acceptance or results of testing.

D. Certify test data in letter signed by authorized representative.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 45 00

QUALITY REQUIREMENTS (MOCK-UP REQUIREMENTS)

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve CONTRACTOR of responsibility for compliance with Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in Sections that specify those activities. Requirements of this Section relate to customized fabrication and installation procedures specified in those Sections. Requirements in those Sections may also cover production of standard products.

2. Specified tests, inspections, and related actions described herein or elsewhere in the Contract Documents do not constitute a limitation on CONTRACTOR'S responsibility to establish and maintain quality-control procedures that comply with requirements of the Contract Document or Applicable Laws.

1.02 RELATED DOCUMENTS

A. Construction Documents as defined in the Construction Services Agreement.
B. Construction Services Agreement.
C. Other General Requirements.
D. Divisions 2 through 33 Sections for specific test and inspection requirements.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM E 548 Guide for General Criteria Used for Evaluating Laboratory Competence.

1.04 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions (other than construction administration activities performed by ARCHITECT) that occur during and after execution of Work to evaluate that completed Work complies with requirements of Contract Documents and Applicable Laws.

C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample Submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation. Mockups are not Samples. Mockups establish standard by which Work will be judged.

D. Testing Agency: Entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean same as testing agency.

1.05 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by design professional are specifically required of CONTRACTOR by Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit written request for additional information to ARCHITECT.

2. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required Submittals, submit statement, signed, and sealed by responsible design professional, for each product and system specifically assigned to CONTRACTOR to be designed or certified by design professional, indicating that products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.06 REGULATORY REQUIREMENTS

A. Copies of Regulations: Obtain copies of following regulations and retain at Site to be available for reference by parties who have reasonable need. Documents include, but are not limited to:

1. Additional documents as requested by Project Inspector, Program Manager, or ARCHITECT.

1.07 SUBMITTALS

A. Reports:

1. Either CONTRACTOR (in those instances where the CONTRACTOR is responsible under the Contract Documents for testing or inspection) or the independent testing or inspection agency responsible for the testing or inspection shall submit certified written report of each inspection, test, or similar service, with copies to Project Inspector, CONTRACTOR, and ARCHITECT. Submit additional copies of each written report directly to Governmental Authorities, when so directed by the Governmental Authorities.

2. Such reports shall include following:

a. Date of issue.

b. Project title and number.

c. Name, address, and telephone number of testing agency.

d. Dates and locations of samples and tests or inspections.

e. Names of individuals making tests and inspections.

f. Description of Work and test and inspection method.

g. Identification of product and Specification Section.

h. Complete test or inspection data.

i. Test and inspection results and interpretation of test results.

j. Ambient conditions at time of sample taking and testing and inspecting.

k. Comments or professional opinion on whether tested or inspected Work complies with Contract Document requirements.

l. Name and signature of laboratory inspector.

m. Recommendations on retesting and reinspecting.

B. Permits, Licenses, and Certificates: For DISTRICT'S records, submit copies of permits, licenses, certifications, and inspection reports required by Applicable Laws or requirements of Contract Documents.

1.08 QUALITY ASSURANCE

A. Specialists: Certain sections of Specifications may require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.

1. Requirement for specialists shall not supersede building codes and other Applicable Laws nor interfere with local trade-union jurisdictional settlements and similar conventions.

B. Testing Agency Qualifications: Agency with experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

C. Preconstruction Testing: Where required by other Sections, testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.

1. CONTRACTOR responsibilities include following:

a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.

b. Submit specimens in timely manner with sufficient time for testing and analyzing results to prevent any Delay to the performance of the Work.

c. Fabricate and install test assemblies using installers who will perform same tasks for Project.

d. When testing is complete, remove assemblies; do not reuse materials on Project.

2. Testing Agency Responsibilities: Submit certified written report of each test, inspection, and similar quality-assurance service to ARCHITECT with copy to CONTRACTOR and Project Inspector. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from Contract Documents.

D. Mockups: Before installing portions of Work requiring mockups, build mockups for each form of construction and finish required to comply with following requirements, using materials indicated for completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by ARCHITECT.

a. ***As a minimum, include the following for mock-up: Metal Wall Panel System, Glazed Aluminum Curtain Wall System with all glass types (colors) specified, Portland Cement Plaster on Lath and on CMU/Studs, ceramic tile floors and walls, exterior concrete finishes.***

b. Mockups shall be provided for all conditions and details where different materials meet as shown on the Drawings.

c. ***Mockup Layout to be provided in Submittal format for review prior to Installation of Mockup. Example of Submittal Mockup Layout is provided after the end of this specification.***

d. ***Minimum 6-foot long by 4-foot-high panel of vertical masonry, including special features and one corner or angle. Panel to include:***

a) Plaster finish
b) Reveals
c) Connection to glazing.
d) Parapet cap.

2. Notify Project Inspector and ARCHITECT seven (7) days in advance of dates and times when mockups will be constructed.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain ARCHITECT'S approval of mockups before starting work, fabrication, or construction and/or modify or replace Mock-up until mock-up is approved.

5. Maintain mockups during construction in undisturbed condition as standard for judging completed Work.

6. Final disposition of mockups shall be as specified in individual Specification Sections.

1.09 QUALITY CONTROL

A. DISTRICT Responsibilities: Where quality control services are indicated as DISTRICT'S responsibility, DISTRICT will engage qualified testing agency to perform these services.

1. DISTRICT will furnish CONTRACTOR with names, addresses, and telephone numbers of testing agencies engaged, and description of types of testing and inspecting they are engaged to perform.

2. Payment for these services will be made to testing and inspecting agency by the Program Manager on behalf of the DISTRICT.

3. Costs for re-testing and re-inspecting of construction that constitutes a replacement or repair to Work that fails, or that is necessitated due to Work failing, to comply with Contract Documents will be at the expense of CONTRACTOR and without adjustment to the Guaranteed Maximum Price.

B. CONTRACTOR Responsibilities: Unless otherwise indicated, provide quality control services specified and required by Governmental Authorities.

1. Engage qualified testing agency to perform these quality control services.

2. CONTRACTOR shall not employ same entity engaged by DISTRICT, unless agreed to in writing by DISTRICT.

3. Notify testing agencies at least forty-eight (48) hours in advance of time when Work that requires testing or inspecting will be performed.

4. Testing and inspecting requested by CONTRACTOR and not required by Contract Documents are CONTRACTOR'S responsibility and performed at CONTRACTOR'S own expense, without adjustment to the Guaranteed Maximum Price.

5. The CONTRACTOR shall submit a statement of responsibility for the construction of lateral forces resisting system complying with 2019 CBC Section 1704A.4.

C. Special Tests and Inspections: DISTRICT will engage testing agency to conduct special tests and inspections required by Governmental Authorities and that under the Contract Documents are the responsibility of DISTRICT.

1. Testing agency will notify Project Inspector, ARCHITECT and CONTRACTOR promptly of irregularities and deficiencies observed in Work during performance of its services.

2. Testing agency will submit certified written report of each test, inspection, and similar quality control service to Project Inspector, ARCHITECT, with copy to CONTRACTOR and to Governmental Authorities.

3. Testing agency will submit final report of special tests and inspections at Substantial Completion, which includes list of unresolved deficiencies.

4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from Contract Documents.

5. Testing agency will retest and reinspect corrected Work. Costs of retesting that is necessitated due to a failure by the Work to comply with the Contract Documents shall be at the CONTRACTOR'S expense and without adjustment to the Guaranteed Maximum Price.

D. Manufacturer's Field Services: Where indicated, CONTRACTOR shall engage factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. CONTRACTOR shall report results in writing to the DISTRICT Representative.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were CONTRACTOR'S responsibility, CONTRACTOR shall provide at its own expense and without adjustment to the Guaranteed Maximum Price the necessary services of retesting and reinspection of the Work that is replaced or repaired due to a failure of the Work to comply with requirements of Contract Documents.

F. Testing Agency Responsibilities: Testing agencies shall cooperate with ARCHITECT, CONTRACTOR, and Project Inspector in performance of their duties. Testing agencies shall provide qualified personnel to perform required tests and inspections, including the following:

1. Notify CONTRACTOR, ARCHITECT, and Project Inspector promptly of irregularities or deficiencies observed in Work.

2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the requirements of the Contract Documents.

3. Submit certified written report, in duplicate, of each test, inspection, and similar quality- control service through CONTRACTOR.

4. Do not release, revoke, alter, or increase requirements of Contract Documents or approve or accept any portion of Work.

5. Do not perform any duties of CONTRACTOR.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to:

1. Access to Work.

2. Incidental labor and facilities necessary to facilitate tests and inspections.

3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency or DISTRICT in obtaining samples.

4. Facilities for storage and field-curing of test samples.

5. Where required by testing agencies, delivery of samples to testing agencies.

6. Preliminary design mix proposed for use for material mixes that require control by testing agency.

7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: CONTRACTOR shall coordinate sequence of activities to accommodate required quality-assurance and quality-control services without Delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare schedule of tests, inspections, and similar quality-control services required by Contract Documents. Submit schedule within fourteen (14) days of issuance of Notice to Proceed.

1. Distribution: Distribute schedule to Project Inspector, ARCHITECT, testing agencies, and each party involved in performance of portions of Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 TESTING AGENCIES

A. Testing agencies and labs shall be DSA-Approved.

3.02 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Sections of the Specifications. Restore patched areas and extend restoration into adjoining areas in manner that eliminates evidence of patching.

2. Comply with Contract Document requirements.

B. Protect construction exposed.

C. Repair and protection are sole CONTRACTOR'S responsibility, regardless of assignment of responsibility for quality control services.

END OF SECTION

(See Mockup Layout Example on next page)

MOCK-UP LAYOUT EXAMPLE
(For reference Only-Sizes may vary)

Note: Layout is for reference only and does not represent this project's actual mockup layout. Note: Dimensions are for reference only

Items to be included in mockup, but not limited to:

Include Concrete curb and studs or CMU with plaster system mockup.

Include Concrete curb and studs or CMU with metal wall panel system mockup. Include Concrete curb at storefront and glass mockup.

Include furring channels for wood panel system mockup. Include exterior concrete slab with types of finishes.

Include depressed concrete slab for all floor tile types in mockup. Include studs or CMU for wall tile mockup.

Mockup to be approximately 4-6 feet tall.

Mockup to provide reveal joints, end and corner conditions, base conditions, and parapet conditions, etc.

Also see specification section for each product for more information.

SECTION 01 45 19

CONTRACTOR CONSTRUCTION QUALITY CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. The intent of this specification is to delineate a plan and procedure to be used by CONTRACTOR, working in partnership with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and its agents, to assure the quality control necessary to provide for a complete, fully functional, high-quality facility in accordance with the intent and meaning of the Contract Documents.

B. CONTRACTOR shall be totally responsible for CONTRACTOR Construction Quality Control (CQC) - which is verification by CONTRACTOR that work performed by CONTRACTOR forces is in compliance with the Contract Documents.

C. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall be responsible for Construction Quality Assurance (CQA) - which is the verification by CONSTRUCTION MANAGER (CM), ARCHITECT of Record (ARCHITECT), Project Inspector (PROJECT INSPECTOR), and Deputy Inspectors that CONTRACTOR has taken the actions and steps defined in the Construction Documents and CONTRACTOR Construction Quality Control Plan accepted by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. Verification shall consist of the Inspection of the Work in place by the ARCHITECT, PROJECT INSPECTOR, and deputy inspectors using established inspection, sampling, testing, and observational techniques.

D. Specification includes definition of:

1. CONTRACTOR requirements for establishing, administering, and maintaining Quality Control (QC) over the Work and ancillary functions though Contract Closeout.

2. Required elements of a Construction Quality Control program.

E. Related Requirements:

1. Section 00 70 00 - General Conditions.
2. Section 00 08 00 - Special Conditions.
3. Section 01 11 00 - Summary of the Work.
4. Section 01 31 13 - Project Coordination.
5. Section 01 31 19 - Project Meetings.
6. Section 01 32 13 - Construction Schedule.
7. Section 01 33 00 - Submittal Procedures.
8. Section 01 74 16 - Storm Water Pollution Prevention Plan.
9. Section 01 74 19 - Construction and Demolition Waste Management.
10. Section 01 77 00 - Contract Closeout.

1.02 OBJECTIVES

A. Require CONTRACTOR to establish and maintain a CQC program as described in this section.

B. Require CONTRACTOR to provide a qualified, full-time Construction Quality Control Manager to direct, manage, control, and document a CQC Plan for the Project that includes a:

1. CQC Manager reporting directly to the person authorized to sign the Contract or an Officer of CONTRACTOR'S firm and not be subordinate to CONTRACTOR'S Project Manager or Superintendent.

2. Adequately staffed CQC organization.

3. CQC plan for the project, keyed to the work sequence, addressing site logistics, planning, submittals, design issue and interpretation coordination, and on-site and off-site Work.

4. Procedure:

   a. To ensure no construction work or testing is performed unless CQC Manager is on the work site unless otherwise approved by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

   b. By which the CQC Manager certifies that submittals, namely: RFCs, shop drawings, etcetera for project materials, equipment, fabrication, construction, and construction operations provided by CONTRACTOR comply with the requirements of the CONTRACT.

   c. By which the CQC Manager certifies that project materials, equipment, fabrication, construction, and construction operations provided by CONTRACTOR comply with the requirements of this CONTRACT.

   d. To ensure coordination drawings have been prepared and reviewed by impacted Subcontractors and trades.

   e. To ensure an activity hazard analysis is conducted for operations specifically identified as having special safety considerations.

   f. For quality control during project commissioning (if applicable).

   g. For expediting project closeout.

5. Schedule and format/agenda for CQC review meetings.

6. Site specific Safety Plan/Injury and Illness Prevention Plan (IIPP) reviewed and accepted by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

7. System to report on the CONTRACTOR'S Quality Control activities.

C. Ensure that Work is performed in accordance with the approved Construction Documents at the specified construction quality level.

1.03 SUBMITTALS

A. For the purposes of the CQC Plan, the term "Submittals" shall include, but not be limited to, required engineering, administrative and material submittals, inspection requests, Requests for Clarification (RFCs), Change Order Proposals (COPs), Requests for Proposals (RFPs) and other project documents. The CQC Manager is responsible for the timelines of each submittal, and shall certify in writing the quality, accuracy, and completeness of submittals.

B. CQC Manager. CONTRACTOR shall submit the resume' of the proposed CQC Manager to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT upon receiving Notice of Award. The proposed CQC Manager shall be approved in writing by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT. The CQC Manager shall be assigned to work on the project as needed to properly comply with the contract documents, through the completion of the Contract Administrative Closeout period and be available at the project site location whenever construction work occurs.

C. CONTRACTOR shall submit a draft Quality Control (CQC) Plan to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT within ten (10) days after issuance of Notice to Proceed. The CQC plan shall include, but not be limited to:

1. A letter from the person authorized to sign the Contract or an Officer of CONTRACTOR'S firm clearly identifying:

   a. CONTRACTOR'S CQC Manager.

   b. CQC Manager as having responsibility and authority to implement and manage CONTRACTOR'S CQC Program.

   c. Lines of authority and reporting for the CQC Manager. (Note: The CQC Manager shall report directly to the person authorized to sign the Contract or an Officer of the CONTRACTOR'S firm. The person signing the letter shall not be the Project Manager or the Superintendent for the project nor report to the Superintendent or persons other than those defined heretofore.)

   d. CQC Manager's authority to direct stoppage, removal, and/or replacement of non-conforming Work.

   e. CQC Manager (or staff reporting directly to CQC Manager) as the direct and only line of contact with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S PROJECT INSPECTOR with sole responsibility for submitting and documenting inspection requests (IRs) to the PROJECT INSPECTOR.

2. Organization Chart identifying CQC positions, names of assigned staff, duties and responsibilities, dedicated hours per week assigned to the project, and qualifications. As a minimum, there shall be, in addition to the CQC Manager:

   a. One (1) administrative assistant.

3. Staff shall be assigned as needed to work at the project site when performing project-related duties. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall assess scheduled payment amounts for required CQC positions not staffed against invoiced Contract amount for the corresponding month.

4. Proposed formats for meeting agendas, minutes, and required reports.

5. Procedures for managing the submittal process, as described in Section 01 33 00, Submittals, including:

   a. Reviews and approvals.

   b. List of required submittals and certifications cross-referenced to the construction drawings and specifications.

   c. Scheduled date of submittals.

   d. Names of CONTRACTOR'S staff authorized to review and certify submittals prior to submission to ARCHITECT/ENGINEER.

6. Procedure for ensuring Construction Coordination Drawings are coordinated with (and reflect) the Contract's Construction Drawings and Specifications.

7. Procedure for preparing an Activity Hazard Analysis (AHA) Plan identifying operations requiring special safety considerations and defining the policy, procedure, and administrative steps to be taken to ensure the preparation and submittal of an AHA during each of the three (3) phases of Construction Quality Control.

8. Testing Plan and Log that identifies tests required (referencing the specification section and/or drawing requiring the test), Subcontractor responsible for each test, scheduled date of test and actual date performed and approved.

9. A plan for coordinating with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S designated commissioning agent to ensure that documentation, measurements, and calibration of systems necessary to complete the Commissioning Plan defined in Section 01 91 13 are performed prior to requesting HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S designated commissioning agent verify and/or observe CONTRACTOR and/or Subcontractor demonstration of operations and/or testing. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT or ARCHITECT of Record may act as Commissioning Agent for this project when applicable.

10. Procedure and documentation required to ensure CONTRACTOR compliance with sustainable building practices during construction and when considering materials for substitutions.

11. Contract Closeout Plan compliant with requirements of Section 01 77 00, Contract Closeout.

12. Procedures and requirements for above-ceiling coordination and installation.

13. Procedures to identify, record and track completion and clearing of rework items (including deviations and corrections to deviations).

14. List of outside firms CONTRACTOR may employ pursuant to executing CONTRACTOR responsibilities identified in the CQC Plan and description of their respective services.

D. CONTRACTOR shall submit the final Construction Quality Control (CQC) Plan to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT within twenty-five (25) days after issuance of Notice to Proceed for review and acceptance.

1. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT reserves the right to require changes in the final CQC Plan and operations as necessary to ensure quality of Work.

2. CONTRACTOR must receive HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S approval prior to implementing changes to the final CQC Plan or operations.

F. CQC Manager Responsibilities and Qualifications

1. CQC Manager shall be designated as person responsible for directing, managing, coordinating, documenting, and reporting CONTRACTOR quality control activities in accordance with CONTRACTOR'S CQC Plan including, if applicable, required CONTRACTOR materials testing and certifications.

2. CONTRACTOR'S CQC Manager shall have significant, relevant documentable training and field experience on building construction projects of a similar scale and be one of the following:

a. ENGINEER or ARCHITECT currently licensed in the State of California.

b. PROJECT INSPECTOR Class 1 or Class 2 with a current California State Certification.

c. International Code Council (ICC)/Office of Statewide Health Planning and Development (OSHPD) Inspector with a current California State Certification.

d. Construction CONTRACTOR or superintendent (or similar position/function) with a minimum of ten (10) years of documentable training and field experience on building construction projects including school projects under the jurisdiction of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

1.04 APPROVALS

A. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall approve in writing the proposed CONTRACTOR CQC Manager prior to start of any Work requiring quality control.

B. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall review and respond to CONTRACTOR'S CQC Plan within fifteen (15) days of receipt.

1. Response shall be in writing.

2. CONTRACTOR shall be assessed HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S actual incurred costs to provide quality control services by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT should CONTRACTOR fail to have an accepted CQC Plan within ninety (90) days of Notice to Proceed.

C. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT reserves the right to require changes in the approved CQC Plan and operations as necessary to ensure quality of the Work.

D. CONTRACTOR shall submit a written request to CONSTRUCTION MANAGER for approval of any proposed change in the CQC Manager, CQC staff or CQC Plan or Procedures a minimum of seven (7) days prior to the proposed change.

E. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall have the right to require the removal and replacement of the CQC Manager or any member of the CQC staff following a minimum of seven (7) days written notice.

F. CONTRACTOR shall receive CONSTRUCTION MANAGER'S acceptance of any proposed changes to the CQC Plan prior to any implementing changes.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 QUALITY CONTROL RESPONSIBILITY

A. The CONTRACTOR'S CQC Manager, Project Superintendent, and Project Manager shall work together effectively. While the CQC Manager shall be the primary individual responsible for quality control, CONTRACTOR personnel, Subcontractor personnel and material suppliers shall be responsible for the quality of their work on the project.

B. Work of the CONTRACT shall not commence prior to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT approval of CQC Manager and acceptance of CQC Plan unless otherwise specifically authorized in writing by CONSTRUCTION MANAGER.

3.02 MEETINGS

A. Weekly CQC Meetings: Upon the start of construction, the CQC Manager shall conduct weekly CQC meetings at the Project Site with the project superintendent, Safety Officer and pertinent Subcontractors starting with the Preconstruction Phase and continuing through completion of the construction. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, PROJECT INSPECTOR, and ARCHITECT may attend these meetings.

1. The CQC Manager shall prepare the minutes of the meeting and provide a copy to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and the PROJECT INSPECTOR within two (2) working days after the meeting.

2. As a minimum, the meetings will address the following:

a. Minutes of the previous meeting.

b. Status of submittals.

c. Schedule and the status of the Work scheduled during the next two (2) weeks relative to submittals needed for that Work.

d. Status of inspection requests and identify pre-inspection requirements.

e. Work to be accomplished in the next fourteen (14) days and the related required documentation.

f. Current and upcoming activities requiring special safety training, resources and/or activity hazard analyses including:

1) The activity hazard analyses prepared and submitted.
2) Fourteen (14) day safety look-ahead schedule.
3) Safety audit findings.
4) Safety deficiency/corrective action log.

g. Resolve CQC and production problems, including open deviations and rework items.

h. Address items that may require revising the CQC Plan.

B. Pre-Construction Submittal Phase

1. CONSTRUCTION MANAGER shall schedule a Pre-submittal Meeting within twenty-one (21) days following Notice of Award. The Pre-submittal Meeting will include key representatives of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT (CONSTRUCTION MANAGER, PROJECT INSPECTOR, key specialty inspectors, key testing agency representatives), CONTRACTOR (and key Subcontractors), and ARCHITECT/ENGINEER (and key sub consultants).

2. Purpose of this meeting is to:

a. Develop a mutual understanding of CONTRACT and the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S CQC Plan requirements prior to Plan development and submittal.

b. Establish the Project Quality approach.

c. Define the scope, content, and documentation required for submittals.

d. Establish the quality requirements for submittals, with a goal of no "Revise and Resubmit" responses to submittals.

e. Define review criteria for each of the submittals.

f. Set timeframes for the preparation, transmittal, and review of the submittals.

g. Establish the framework for a Project Quality Assurance/Quality Control Team and the associated quality culture for the life of the project.

h. Foster teamwork between CONSTRUCTION MANAGER, CONTRACTOR (including CQC Manager and Subcontractors), PROJECT INSPECTOR (and subordinate specialty inspectors and testing entities), and the ARCHITECT/ENGINEER (and sub consultants) and will function as an initial teambuilding intervention.

i. Schedule follow-on meetings between each of the Subcontractors and their respective counterpart sub consultants for the purpose of defining in detail the scope, content and documentation required for submittals.

3. The results of this meeting shall be incorporated into the CONTRACTOR'S Construction Quality Control Plan submittal.

3.03 THREE-PHASE CONSTRUCTION QUALITY CONTROL PROCESS

A. For each project activity and each trade associated with that activity, CONTRACTOR shall perform a three-phase construction quality control process with that activity to ensure each trade's Work complies with CONTRACT requirements and is coordinated with other trades. The three-phase quality control process shall address both on-site and off-site Work and include:

B. Preparatory Phase: CONTRACTOR shall conduct a Preparatory Phase meeting with the superintendent, CONTRACTOR'S Safety Officer, Subcontractor, and the foreman responsible for that portion of Work.

1. A Preparatory Phase meeting shall be conducted a minimum of five working days and maximum of ten (10) working days prior to the scheduled start of the Work.

2. CONSTRUCTION MANAGER and PROJECT INSPECTOR shall be notified at least two (2) working days prior to each Preparatory Phase meeting.

3. The CQC Manager shall prepare and distribute an agenda to attendees at least two working days prior to each Preparatory Phase meeting.

4. At each Preparatory Phase meeting, the following tasks shall be performed:

a. Review the applicable Contract Document specification sections.

b. Review the applicable Contract Document and trade coordination drawings.

c. Review codes, jurisdictional requirements, and HACIENDA LA PUENTE UNIFIED DISTRICT standards relative to execution of the applicable portion of the Work.

d. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and reviewed.

e. Verify, when required, the receipt of approved factory test results.

f. Review the testing plan and testing schedule to ensure that provisions have been made to provide the required QC testing.

g. Review the safety plan and appropriate activity hazard analysis to ensure applicable safety requirements are met.

h. Examine the work areas to ensure the required preliminary Work has been completed.

i. Discuss construction methods, as necessary.

j. Confirm coordination with other trades.

k. Confirm above-ceiling coordination is completed.

l. Confirm service accessibility for installed systems.

m. Confirm PROJECT INSPECTOR inspection requirements of the WORK and Inspection Request timing and submittal requirements.

5. The CQC Manager shall prepare minutes of Preparatory Phase meetings and provide a copy to attendees of the meeting within two (2) working days after each meeting.

6. Results of preparatory phase meeting and actions shall be documented in the weekly CONTRACTOR Quality Control Report.

C. Initial Phase: When construction crews are ready to start work, the CQC Manager shall coordinate with the superintendent, CONTRACTOR'S Safety Officer and foreman responsible for the Work and:

1. Notify CONSTRUCTION MANAGER and PROJECT INSPECTOR at least two working days in advance of starting the Work.

2. Observe the initial Work activities to ensure compliance with Contract requirements including Safety.

3. Perform the following:

a. Confirm that the quality of materials, fabrication, and execution provided meets requirements.

b. Resolve potential conflicts.

c. Review the Safety Plan and appropriate activity hazard analysis and verify that the applicable safety requirements are met.

d. Ensure that testing is performed by the approved laboratory.

4. Repeat the Initial Phase for each new crew assigned to work on-site or when compliance falls below acceptable levels when so notified by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

5. Document observations and results of Initial Phase coordination and activities in the weekly CONTRACTOR Quality Control Report and CONTRACTOR Safety Report.

D. Follow-Up Phase: After the work has begun, perform the following:

1. Document results and observations in the weekly CONTRACTOR Quality Control Report.

2. Daily, or more frequently as necessary, until completion of Work:

a. Ensure the Work is in compliance with Contract requirements.

b. Identify and document Subcontractor Work requiring rework or correction.

c. Ensure that rework items are documented and are corrected.

d. Ensure that the quality of materials, fabrication, and execution provided complies with the requirements of the Contract Documents.

e. Review and sign off on Inspection Requests prior to issuance to PROJECT INSPECTOR.

f. Ensure that testing is performed by the approved laboratory.

g. Ensure safety requirements and practices are observed.

E. Notify CONSTRUCTION MANAGER, PROJECT INSPECTOR, and involved local regulatory agencies or utilities at least fourteen (14) days prior to the start of Preparatory and Start-Up Phases for Off-Site Work.

3.04 ACTIVITY HAZARD ANALYSIS - CONTRACTOR SAFETY PROGRAM

A. Before beginning each Work activity, CONTRACTOR shall prepare and utilize for each task an AHA or Job Safety Analysis (JSA). The AHA/JSA shall be reviewed by each work crew prior to the activity and re-addressed any time there are changes in that activity. A sample of an AHA can be found on the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Website or in the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Safety Standards under JSA.

1. Activity Hazard Analyses will define the activities being performed and identify the sequences of work, specific hazards anticipated, site conditions, materials, and control measures to be implemented to eliminate or reduce each hazard.

2. Work shall not begin until the AHA/JSA for the work activity has been accepted by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and discussed with parties engaged in the work activity (CONTRACTOR, Subcontractors, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT representatives) at the preparatory and initial phase meetings required by the Construction Quality Control process.

3. The names of the competent/qualified person(s) required to be present during a particular activity (e.g., excavations, fall protection, other activities required by OSHA or similar jurisdictions) shall be identified and included in the AHA/JSA. Proof of their competency shall be submitted to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT for acceptance prior to the start of that work activity.

a. If more than one competent/qualified person will be used on the AHA/JSA activity, a list of names shall be submitted as an attachment to the AHA form. Those listed shall be competent/qualified for the type of work involved in the AHA and familiar with current site safety policies, procedures, and issues.

b. If a new competent/qualified person is added to the staff, the original list attached to the AHA form shall be updated. The new person shall acknowledge in writing that he/she has reviewed the AHA/JSA and is familiar with the current site safety issues.

4. The AHA/JSA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).

B. An AHA/JSA shall be prepared and documented for each project work activity as warranted by the hazards associated with the activity. Generally, an AHA shall be prepared for field work activities.

3.05 REQUIRED CONTRACTOR QUALITY CONTROL CERTIFICATIONS

A. Submittal Certification: The CQC Manager shall certify in writing as to the adequacy and completeness of submittals.

B. CONTRACTOR Quality Control Report Certification: Furnish weekly CONTRACTOR Quality Control Reports signed by CQC Manager containing the following statement: "On behalf of CONTRACTOR, I certify that this report is complete, correct and equipment and material used, and work performed during this reporting period is in compliance with the Contract Documents to the best of my knowledge, except as noted in this report."

C. Invoice Certification: Include a certificate with each payment request, signed by CQC Manager, attesting that record drawings are current and the Work for which payment is requested, including stored material, is in compliance with Contract requirements.

D. Completion Certification: Upon completion of designated portion of the Work, furnish a certificate to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, signed by the CQC Manager, attesting that "...the Work has been completed, inspected, tested, and is in compliance with the Contract requirements."

E. Submittals: CQC Manager shall attest in writing as to the adequacy and completeness of submittals.

F. Drawing Certification: The CQC Manager shall certify in writing as to the accuracy and completeness of submitted CONTRACTOR "As-Built" and trade coordination drawings.

G. Punch List Certification: The CQC Manager shall attest in writing as to the accuracy and completeness of rework and punch list corrective activities.

3.06 PROJECT CLOSEOUT

A. The CQC Manager shall be responsible for ensuring the quality and completeness of CONTRACTOR closeout activities as they relate to the Work of the contract including, but not limited to, remedial work, final submittals, as-built, and coordination drawings, maintenance and operations manuals and training, stacks of spare parts and materials, and the like.

B. Prior to CONTRACTOR submission of the Request for Certificate of Completion, CQC Manager shall:

1. Ensure completion of Work except those minor items on CONTRACTOR'S Punch List.

2. Conduct a CONTRACTOR Pre- Completion Inspection of the entire Work to:

   a. Identify any additional items of construction requiring correction to comply with the project documents.

   b. Cause trades to promptly correct identified defects in their respective Work.

   c. Re-inspect the Work to ensure compliance with project documents.

3. Certify that items, except those minor Work items on CONTRACTOR'S Punch List, have been completed in accordance with the contract plans and specifications.

4. Ensure required closeout documents, as outlined in Section 01 77 00, have been submitted to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

C. CONTRACTOR'S Request for notice of Completion shall have attached the Punch List prepared by CONTRACTOR with known corrective items indicated and be certified by the CQC Manager that items listed and on the Inspector List or with a Deviation/Corrective Notice as needing rework or correction have been corrected in accordance with the plans and specifications.

D. Upon determination by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT that the Work is Complete and ready for inspection, the PROJECT INSPECTOR shall conduct a Completion Inspection and prepare an Inspector List (Working Copy) incorporating input from the ARCHITECT, its subconsultants and other HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT representatives. The CQC Manager and other CONTRACTOR representatives may participate in this Completion Inspection.

E. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will provide a notice of Completion with Inspector List (Working Copy) attached. The Inspector Punch List (Master Copy) shall be provided within five (5) days of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S provision of the Notice of Completion.

F. Within the time allowed for Administrative Closeout of the contract, CONTRACTOR shall correct the deficient Work indicated on the Inspector Punch List (Master Copy). The CQC Manager shall certify that the Work of the Inspector Punch List (Master Copy) has been completed and ask for a Final Inspection of the Work. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will re-inspect the Work and identify any items still requiring correction.

G. Upon correction of items on the Inspector Punch List (Master Copy) or at the end of the Administrative Closeout period, HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall issue a Notice of Contract Completion to CONTRACTOR directing the cessation of CONTRACTOR and Subcontractor activities and advising of any assessment of monies for uncorrected Punch List items or undelivered Record Documents.

3.07 DOCUMENTATION

A. CQC Manager shall maintain current and complete records of on-site and off-site construction and CQC program operations and activities including, but not limited to:

B. CONTRACTOR Daily Construction Report

1. The CONTRACTOR Daily Construction Report shall be generated as required in Section 01 50 00, Construction Facilities and Temporary Controls, and shall include the following information:

a) Date of report, name of CONTRACTOR, and superintendent present.

b) Weather conditions in the morning and in the afternoon including maximum and minimum temperatures.

c) List of CONTRACTOR and Subcontractor personnel on the Project site, their trades, employer, Work location, description of work performed (corresponding to schedule activity numbers) and hours worked.

d) List of job safety actions taken, and safety inspections conducted. Indicate that identified safety deficiencies have been corrected and provide related documentation of the following:

1) Job safety meetings held (including sign-in sheets).

2) Lost time accidents/incidents (including witness statements and photographs).

3) Daily written safety inspections conducted including, as a minimum when applicable:

a) Fire extinguishers.

b) Crane certification/equipment operator licenses.

c) Trenching/shoring/scaffold/high voltage electrical/ elevated work.

d) Personal Fall Arrest System (PFAS) equipment/ harnesses, spider boxes.

4) Hazardous material/waste released into the environment.

5) Meetings held, including CQC preparatory and initial phase meetings.

a) List of equipment/material received that day, and which is incorporated into the project.

b) List of construction and plant equipment on the Project site including number of hours used, idle, and down for repair. Identify whether equipment is CONTRACTOR-owned or rental.

c) Include a "remarks" section in this report for directions, problems, and delays, drawing coordination and conflicts, field changes, records of visitors, and any other relevant issues.

d) List of items, generated by CQC staff, observed as requiring correction or having been corrected.

2. Terminology used for reporting of Work in the CONTRACTOR Daily Construction Report shall be consistent with terminology in the construction schedule.

3. Reports shall be prepared, signed, and dated by CONTRACTOR'S project superintendent. CQC Manager shall review and initial CONTRACTOR Daily Construction Reports, add comments as necessary and attach to the CONTRACTOR Quality Control Report prepared for the same day.

C. CONTRACTOR Quality Control Report:

1. Weekly reports shall be prepared, certified, and submitted on the first Monday following the reporting period to CONSTRUCTION MANAGER and PROJECT INSPECTOR for each day Work was performed during the week and/or weekly for every period of no-work.

2. Terminology used for reporting of Work shall be consistent with terminology in the construction schedule or contract documents.

3. Reports shall be prepared, signed, and dated by the CQC Manager and include the following information:

a. identification of the Work and its associated construction quality control phase (Preparatory, Initial, Follow-up) including:

1) Results of Preparatory Phase meetings held during the reporting week, including location of the Work and list of personnel presents at the meeting and that tasks listed in 3.03.A.4 were addressed and performed.

2) Results from Initial Phase meetings held during the week, including location of the Work, list of trades involved, and personnel present at the meeting. Indicate in the report that:

a) Preliminary Work was done correctly.

b) Work is in compliance with CONTRACT and jurisdictional requirements.

c) Materials, fabrication, and execution are satisfactory.

d) Safety requirements were met.

e) Samples have been prepared and approved.

f) Required testing to be performed, by whom and verify that the results are in compliance with requirements.

g) Required tests were performed by the approved testing laboratory.

3) Results of Follow-Up Phase observations and inspections conducted during the week including verifying:

a) Location of the Work.

b) Work was done correctly.

c) Work complies with CONTRACT requirements.

d) Materials, fabrication, and execution are satisfactory.

e) Required testing has been performed, by whom and verify that the results are in compliance with requirements.

f) Required tests were performed by the approved testing laboratory and individual responsible for performing the tests.

b. Safety-related activities including operations, incidents, analyses, and lessons learned.

c. List of corrected rework items along with the corrective action taken.

d. List of rework items identified by CQC staff and/or PROJECT INSPECTOR but not corrected by close of business for the reporting period.

e. Results of the three phases of quality control for off-site Work, if applicable, including actions taken.

f. Status of submittals, namely: RFCs, materials, project schedules, activity hazard analyses, etc.

g. Status of Change Order Proposals, pending and submitted.

h. “Lessons learned” from the identification and resolution of issues during the reporting week.

i. Results of the three phases of construction quality control meetings for off-site Work (if applicable) including actions taken.

4. Include a “remarks” section listing directions received, problem areas, any deviation from the CQC Plan, other meetings, as-built drawing updates reports, corrective direction and action, and other relevant information.

D. Testing Plan and Log

1. As tests are performed, the CQC Manager shall record in the “Testing Plan and Log”:

a. Date the test was conducted and recorded results.

b. Date the test results were received by CONTRACTOR.

c. Date the test results were received by PROJECT INSPECTOR.

d. Verification and identification of the approved testing laboratory that was used.

2. Attach a current, updated copy of the “Testing Plan and Log” to the last weekly CONTRACTOR Quality Control Report of each month.

E. Correction/Deviation Items List: The CQC Manager shall:

1. Maintain a list identifying items/Work observed by the CQC Manager and/or CQC staff that does not comply with CONTRACT requirements.

2. Maintain a status list of items identified by CONSTRUCTION MANAGER or by PROJECT INSPECTOR on the Inspector List or with a Deviation/Corrective Notice as needing correction and:

a. The date the item was originally identified.

b. The date the item was corrected.

c. The date PROJECT INSPECTOR was notified items on the Inspector List or having a Deviation/Corrective Notice were corrected.

3. CQC Manager shall attach the most current “Rework Items List” to the last weekly CONTRACTOR Quality Control Report of each month.

4. CONTRACTOR shall be responsible for including on this list items requiring rework including those identified by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, PROJECT INSPECTOR, or ARCHITECT.

F. Storm Water Pollution Prevention Plan (SWPPP): CQC Manager is required to:

1. Review the SWPPP for compliance in accordance with Section 01 33 00 prior to submission.

2. Prepare and submit to CONSTRUCTION MANAGER in accordance with the date established in the Notice to Proceed 1.

3. Review and ensure timely submission of required monitoring and final reports.

G. Construction and Demolition (C and D) Waste Management: The CQC Manager is required to:

1. Review the C and D Waste Management plan for compliance in accordance with Section 01 74 19 prior to submission.

2. Within fifteen (15) days after Notice to Proceed, and prior to any waste removal, submit the plan to the CONSTRUCTION MANAGER for review and approval.

3. Review and ensure timely submission of required monitoring and final reports.

H. California Environmental Quality Act (CEQA) Report: The CQC Manager is required to:

1. Verify compliance with CEQA requirements at the project site.

2. Review and ensure timely submission of required monitoring and final reports.

I. Environmental Import/Export Materials: The CQC Manager is required to:

1. Review the import/export Sampling Strategy Plan (SSP) prepared by the CONTRACTOR'S licensed environmental professional as outlined in Section 01 45 24.

2. Review the Draft Certification Report prepared by the CONTRACTOR'S licensed environmental professional.

3. Provide required certifications and manifests.

J. Test and Balance: The CQC Manager is required to:

1. Review the qualifications of the Test and Balance agency directly subcontracted to the CONTRACTOR.

2. Review the Work of the Test and Balance agency as part of the CQC program.

K. Trade Coordination Drawings: The CQC Manager shall:

1. Facilitate the preparation and utilization of trade coordination drawings as required under Section 01 31 13.

2. Ensure and certify that the trade coordination drawings are complete and are continuously updated to reflect changes in the Work.

3. Ensure that the trade coordination drawings are used during the Preparatory Phase for each scheduled construction operation such that the Work of trades is properly coordinated and free from interference and conflict.

4. Field changes arising from the coordination of the respective trades will be reflected in revised trade coordination drawings.

5. Trade coordination drawings will be updated and certified monthly by the CQC Manager as to their accuracy and completeness precedent to review by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

L. As-Built Drawings: CQC Manager shall review the as-built drawings required by Section 01 77 00, CONTRACTOR'S AS-BUILT DOCUMENTS, to ensure as-built drawings are:

1. Kept current on a weekly basis.

2. Marked to show precise, referenced locations of any deviations made from the Contract Document drawings or specifications.

M. As part of the Request for Completion, the CQC Manager shall attest to the accuracy of the as-built drawings and submit the as-built drawings to the CONSTRUCTION MANAGER with a certificate attesting to the accuracy of the As-Built drawings prior to Administrative Closeout.

END OF SECTION

SECTION 01 4523

TESTING AND INSPECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Testing and inspection services to meet requirements of the California Building Code (CBC).

B. Tests of materials are required by a DSA certified testing agency as set forth in Section 4- 335 of the California Building Standards Commission's, California Administrative Code.

1.02 RELATED REQUIREMENTS

A. Section 01 3113 - Project Coordination
B. Section 01 3216 - Construction Schedule
C. Section 01 3229 - Project Forms
D. Section 01 3300 - Submittal Procedures
E. Section 01 5000 - Construction Facilities and Temporary Controls
F. Section 01 6000 - Product Requirements
G. Section 01 7329 - Cutting and Patching
H. Section 01 7700 - Contract Closeout
I. Section 01 7836 - Warranties

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 TESTS

A. OWNER will select and provide an independent DSA certified testing agency (the agency) to conduct tests, sampling, and testing of materials. Selection of material to be tested shall be by the agency and not by CONTRACTOR.

B. Any material shipped from the source of supply prior to having satisfactorily passed such testing and inspection, or prior to the receipt of notice from PI such testing and inspection is not required, shall not be incorporated into the Work.

C. OWNER will select, and directly reimburse, the agency for costs of all DSA required tests and inspections; however, the agency but may be reimbursed by CONTRACTOR for such costs as specified or noted in related sections of the Contract Documents.

D. The independent testing agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.

E. The agency shall not perform any duties of CONTRACTOR.

F. CONTRACTOR shall provide an insulated curing box with the capacity for twenty (20) concrete cylinders and will relocate said box and cylinders as rapidly as required in order to provide for progress of the Work.

3.02 TEST REPORTS

A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations, when and as required, shall also be reported. Reports shall indicate the material (or materials) was sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2, as indicated on the Drawings. Test reports shall indicate specified design strength and specifically state whether or not the material (or materials) tested comply with the specified requirements.

3.03 VERIFICATION OF TEST REPORTS

A. Each testing agency shall submit to the Division of the State Architect, in duplicate, a verified report covering all tests required to be performed by that agency during the progress of the Work. Such report, covering all required tests, shall be furnished prior to Substantial Completion and/or, when construction on the Work is suspended, covering all tests up to the time of Work suspension.

3.04 INSPECTION BY OWNER

A. OWNER, and its representatives, shall have access, for purposes of inspection, at all times to all parts of the Work and to all shops wherein the Work is in preparation. CONTRACTOR shall, at all times, maintain proper facilities and provide safe access for such inspection.

B. OAR shall have the right to reject materials and/or workmanship deemed defective Work and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from the premises and legally disposed of without charge to OWNER. If CONTRACTOR does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, OWNER may correct such defective Work and proceed in accordance with related Articles of the Contract Documents.

C. CONTRACTOR is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements.

3.05 PROJECT INSPECTOR

A. A Project Inspector shall be employed by OWNER in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein. Additional DSA certified inspectors may be employed and assigned to the Work by OWNER in accordance with the requirements of California Building Standards Commission's, California Administrative Code with their duties as specifically defined in Section 4-333(b).

B. Inspection of Work shall not relieve CONTRACTOR from any obligation to fulfill all terms and conditions of the Contract Documents.

C. CONTRACTOR shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

3.06 TESTS AND INSPECTIONS

A. The following tests and inspections do not limit inspection of the Work but are required by DSA, other agencies, or are required in related Sections of the Contract Documents.

See the attached DSA form 103 - Listing of Structural Tests & Special Inspections - 2019 CBC

END OF SECTION

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS, 2019 CBC

Application Number:
03-122864
DSA File Number:

School Name:
Temple Academy
Increment Number:

School District:
Hacienda La Puente Unified School District
Date Created:
2023-06-14 11:17:26

2019 CBC

IMPORTANT: This form is only a summary list of structural tests and some of the special inspections required for the project. Generally, the structural test sand special inspections noted on this form are those that will be performed by the Geotechnical Engineer of Record, Laboratory of Record, or Special Inspector. The actual complete test and inspection program must be performed as detailed on the DSA approved documents. The appendix at the bottom of this form identifies work NOT subject to DSA requirements for special inspection or structural testing. The project inspector is responsible for providing inspection of all facets of construction, including but not limited to, special inspections not listed on this form such as structural wood framing, high-load wood diaphragms, cold-formed steel framing, anchorage of non-structural components, etc., per Title 24, Part 2, Chapter 17A (2019 CBC).

****NOTE:** Undefined section and table references found in this document are from the CBC, or California Building Code.

KEY TO COLUMNS

1. TYPE	2. PERFORMED BY
Continuous - Indicates that a continuous special inspection is required. **Periodic** - Indicates that a periodic special inspection is required. **Test** - Indicates that a test is required.	**GE** - Indicates that the special inspection shall be performed by a registered geotechnical engineer or his or her authorized representative. **LOR** - Indicates that the test or special inspection shall be performed by a testing laboratory accepted in the DSA Laboratory Evaluation and Acceptance (LEA) Program. See CAC Section 4-335. **PI** - Indicates that the special inspection may be performed by a project inspector when specifically approved by DSA. **SI** - Indicates that the special inspection shall be performed by an appropriately qualified/approved special inspector.

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (SOILS), 2019 CBC

Table 1705A.6, Table 1705A.7, Table 1705A.8

Application Number:	**School Name:**	**School District:**
03-122864	Temple Academy	Hacienda La Puente Unified School District
DSA File Number:	**Increment Number:**	**Date Created:**
		2023-06-14 11:17:26

Geotechnical Reports: Project has a geotechnical report, or CDs indicate soils special inspection is required by GE

	S1. GENERAL:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Verify that: • Site has been prepared properly prior to placement of controlled fill and/or excavations for foundations. • Foundation excavations are extended to proper depth and have reached proper material. • Materials below footings are adequate to achieve the design bearing capacity.	**Periodic**	**GE***	* By geotechnical engineer or his or her qualified representative. (See Appendix for exemptions.)

	S2. SOILCOMPACTION AND FILL:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Perform classification and testing of fill materials.	**Test**	**LOR***	* Under the supervision of the geotechnical engineer.
✔	**b.** Verify use of proper materials, densities and inspect lift thicknesses, placement, and compaction during placement of fill.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. (Refer to specific items identified in the Appendix for exemptions where soils SI and testing may be conducted under the supervision of a geotechnical engineer or LOR's engineering manager. In such cases, the LOR's form DSA 291 shall satisfy the soil SI and test reporting requirements for the exempt items.)
✔	**c.** Compaction testing.	**Test**	**LOR***	* Under the supervision of the geotechnical engineer. (Refer to specific items identified in the Appendix for exemptions where soils testing may be conducted under the supervision of a geotechnical engineer or LOR's engineering manager. In such cases, the LOR's form DSA 291 shall satisfy the soil test reporting requirements for the exempt items.)

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Table 1705A.6, Table 1705A.7, Table 1705A.8

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	S3. DRIVEN DEEP FOUNDATIONS (PILES):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Verify pile materials, sizes and lengths comply with the requirements.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**b.** Determine capacities of test piles and conduct additional load tests as required.	**Test**	**LOR***	* Under the supervision of the geotechnical engineer.
☐	**c.** Inspect driving operations and maintain complete and accurate records for each pile.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**d.** Verify locations of pile sand their plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and record any pile damage.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**e.** Steel piles.	Provide tests and inspections per STEEL section below.		
☐	**f.** Concrete piles and concrete filled piles.	Provide tests and inspections per CONCRETE section below.		
☐	**g.** For specialty piles, perform additional inspections as determined by the registered design professional in responsible charge.	*	*	* As defined on drawings or specifications.

	S4. CAST-IN-PLACE DEEP FOUNDATIONS (PIERS):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Note**
☐	**a.** Inspect drilling operations and maintain complete and accurate records for each pier.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. (See Appendix for exemptions.)

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Table 1705A.6, Table 1705A.7, Table 1705A.8

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	Test or Special Inspection	Type	Performed By	Code References and Note
☐	**b.** Verify pier locations, diameters, plumbness, bell diameters (if applicable), lengths and embedment into bedrock (if applicable); record concrete or grout volumes.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. (See Appendix for exemptions.)
☐	**c.** Confirm adequate end strata bearing capacity.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. (See Appendix for exemptions.)
☐	**d.** Concrete piers.	Provide tests and inspections per CONCRETE section below.		

	S5. RETAINING WALLS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Placement, compaction, and inspection of backfill.	**Continuous**	**GE***	**1705A.6.1.** * By geotechnical engineer or his or her qualified representative. (See S2 above).
✔	**b.** Placement of soil reinforcement and/or drainage devices.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**c.** Segmental retaining walls; inspect placement of units, dowels, connectors, etc.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. See DSA IR 16-3.
✔	**d.** Concrete retaining walls.	Provide tests and inspections per CONCRETE section below.		
✔	**e.** Masonry retaining walls.	Provide tests and inspections per MASONRY section below.		

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	S6. OTHER SOILS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Soil Improvements	**Test**	**GE***	Submit a comprehensive report documenting final soil improvements constructed, construction observation and the results of the confirmation testing and analysis to CGS for final acceptance. * By geotechnical engineer or his or her qualified representative.
✔	**b.** Inspection of Soil Improvements	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**c.**			

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Table 1705A.3; ACI 318-14 Sections 26.12 & 26.13

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	C1. CAST-IN-PLACE CONCRETE			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Verify use of required design mix.	**Periodic**	**SI**	**Table 1705A.3 Item 5, 1910A.1.**
✔	**b.** Identify, sample, and test reinforcing steel.	**Test**	**LOR**	**1910A.2;** ACI 318-14 Section 26.6.1.2; DSA IR17-10. (See Appendix for exemptions.)
✔	**c.** During concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	**Test**	**LOR**	**Table 1705A.3 Item 6**; ACI 318-14 Sections 26.5 & 26.12.
✔	**d.** Test concrete (f'_c).	**Test**	**LOR**	**1905A.1.15;** ACI 318-14 Section 26.12.
✔	**e.** Batch plant inspection: **Continuous**	**See Notes**	**SI**	Default of **'Continuous'** per **1705A.3.3**. If approved by DSA, batch plant inspection may be reduced to **'Periodic'** subject to requirements in Section **1705A.3.3.1** or eliminated per **1705A.3.3.2.** See IR17-13. (See Appendix for exemptions.)
✔	**f.** Welding of reinforcing steel.	Provide special inspection per STEEL, Category S/A4(d) & (e) and/or S/A5(g) & (h) below.		

	C2. PRESTRESSED / POST-TENSIONED CONCRETE (IN ADDITION TO SECTION C1):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Sample and test prestressing tendons and anchorages.	**Test**	**LOR**	**1705A.3.4, 1910A.3**
☐	**b.** Inspect placement of prestressing tendons.	**Periodic**	**SI**	**1705A.3.4, Table 1705A.3 Items 1 & 9.**

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Table 1705A.3; ACI 318-14 Sections 26.12 & 26.13

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	Test or Special Inspection	Type	Performed By	Code References and Notes
☐	**c.** Verify in-situ concrete strength prior to stressing of post-tensioning tendons.	**Periodic**	**SI**	**Table 1705A.3 Item 11.** Special inspector to verify specified concrete strength test prior to stressing.
☐	**d.** Inspect application of post-tensioning or prestressing forces and grouting of bonded prestressing tendons.	**Continuous**	**SI**	**1705A.3.4, Table 1705A.3 Item 9;** ACI 318-14 Section 26.13

	C3. PRECAST CONCRETE (IN ADDITION TO SECTION C1):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Inspect fabrication of precast concrete members.	**Continuous**	**SI**	ACI 318-14 Section 26.13.
☐	**b.** Inspect erection of precast concrete members.	**Periodic**	**SI***	**Table 1705A.3 Item 10.** * May be performed by PI when specifically approved by DSA.

	C4. SHOTCRETE (IN ADDITION TO SECTION C1):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Inspect shotcrete placement for proper application techniques.	**Continuous**	**SI**	**1705A.19, Table 1705A.3 Item 7, 1908A.6, 1908A.7, 1908A.8, 1908A.9, 1908A.11, 1908A.12.** See ACI 506.2-13 Section 3.4, ACI 506R-16.
☐	**b.** Sample and test shotcrete (f'_c).	**Test**	**LOR**	**1908A.5, 1908A.10.**

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Table 1705A.3; ACI 318-14 Sections 26.12 & 26.13

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	C5. POST-INSTALLED ANCHORS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Inspect installation of post-installed anchors	**See Notes**	**SI***	**1617A.1.19, Table 1705A.3 Item 4a (Continuous) & 4b (Periodic), 1705A.3.8** (See Appendix for exemptions). ACI 318-14 Sections 17.8 & 26.13. * May be performed by the project inspector when specifically approved by DSA.
✔	**b.** Test post-installed anchors.	**Test**	**LOR**	**1910A.5.** (See Appendix for exemptions.)

	C6. OTHERCONCRETE:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.**			

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1705A.4; TMS 602-16, Tables 3 and 4.

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	M1. STRUCTURAL MASONRY: (f'm = 2000 psi)			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Mill certificate indicates compliance with requirements for reinforcement, anchors, ties, fasteners, and metal accessories. See item C1(b) for identification, sampling, and testing of reinforcing steel.	**Periodic**	**SI***	**2103A.4**; TMS602-13 Article 1.5B.2 & 2.4. * To be performed by qualified LOR representative. Applicable testing by LOR. See IR 17-10.16 for unidentified reinforcing steel.
✔	**b.** Producer's certificate of compliance for masonry units, mortar, and grout materials.	**Test**	**LOR**	**1705A.4, 2103A.2.1, 2103A.3, 2103A.5;** TMS602-16 Articles 1.5B.2 2.1, 2.2, 2.6A and 2.6B, and Table 6 footnote 3.
✔	**c.** Test masonry (f'_m).	**Test**	**LOR**	**1705A.4. For Unit Strength: 2105A.3** (2114.6.1+); TMS602-16 Articles 1.4B.2 ,1.5B.1 & 1.5B.2. **For Prism (required when f'_m > 2000 psi):2105A.2;** TMS602-16 Articles 1.4B.3, 1.4B.4, 1.5B.1 & 1.5B.2.
✔	**d.** Verify proportions or properties of site-prepared, premixed or preblended mortar.	**Periodic**	**SI**	TMS602-16, Table 3 Item 5, Table 4 Item 1a. DSA PR20-01.
✔	**e.** Verify proportions or properties of site-prepared, premixed or preblended grout.	**Periodic**	**SI**	TMS602-16, Table 3 Item 5, Table 4 Item 2d.
✔	**f.** Batch plant inspection: **Continuous**	**See Notes**	**SI**	Default of **'Continuous'** per **1705A.3.3**. If approved by DSA, batch plant inspection may be reduced to **'Periodic'** subject to requirements in Section **1705A.3.3.1** or eliminated per **1705A.3.3.2.** See IR17-13. (See Appendix for exemptions.)
✔	**g.** Test core-drilled samples.	**Test**	**LOR**	**2105A.4**. (See Appendix for exemptions.)
☐	**h.** Inspect preparation of prisms.	**Continuous**	**SI**	TMS602-16 Articles 1.4.B.3 & 1.4.B.4 & Table 4 Item 4.
✔	**i.** Verify size, location and condition of all dowels, construction supporting masonry, etc.	**Periodic**	**SI**	
✔	**j.** Verify size, grade and type of reinforcement, connectors, and anchor bolts. Verify size and location of structural members.	**Periodic**	**SI**	TMS602-16 Table 4, Items 1c & 3c.

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	Test or Special Inspection	Type	Performed By	Code References and Notes
✔	**k.** Inspect placement of reinforcement, anchor bolts, and connectors.	**Continuous**	**SI**	TMS602-16 Table 4 Item 2c.
✔	**l.** Placement, consolidation, and reconsolidation of grout.	**Continuous**	**SI**	TMS602-16 Table 4 Item 3h.
✔	**m.** Inspect placement of masonry units and construction of mortar joints.	**Periodic**	**SI**	TMS602-16 Table 4 Item 3b.
✔	**n.** Verify preparation, construction, and protection of masonry during cold weather (temperature below 40º F) or hot weather (temperature above 90º F).	**Periodic**	**SI***	TMS602-16 Table 4 Item 3f. * May be performed by the project inspector when specifically approved by DSA.
✔	**o.** Inspect type, size and location of anchors and all other items to be embedded in masonry including other details of anchorage of masonry to structural members, frames, and other construction.	**Continuous**	**SI**	TMS602-16 Table 4 Item 3d.
✔	**p.** Inspect grout space, including mortar protrusions, prior to placement of grout.	**Continuous**	**SI**	TMS602-16 Table 4 Item 2a.
✔	**q.** Welding of reinforcing steel.	TMS602-16 Table 4 Item 3e. Provide special inspection per STEEL, Category S/A4(d) & (e) and/or S/A5(g) & (h) below.		

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	Test or Special Inspection	Type	Performed By	Code References and Notes
	M2. VENEER OR GLASS BLOCK PARTITIONS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Verify proportions of site prepared mortar and grout and/or verify certification of premixed mortar.	**Periodic**	**SI**	TMS602-16 Table 3 Item 5 and Table 4 Items 1a& 2d.
☐	**b.** Inspect placement of units and construction of mortar joints.	**Periodic**	**SI**	TMS602-16 Table 4 Item 3b.
☐	**c.** Inspect placement of wire, connectors, and anchors	**Periodic**	**SI**	TMS602-16 Table 4 Item 2c.
☐	**d.** Inspect type, size and location of anchors and all other items to be embedded in masonry veneer including details of anchorage of masonry to veneer backing, frames and other construction.	**Periodic**	**SI**	TMS602-16 Table 4 Item 3d.
☐	**e.** Verify preparation, construction, and protection of masonry during cold weather (temperature below 40º F) or hot weather (above 90º F).	**Periodic**	**SI***	TMS602-16 Table 4 Item 3f. * May be performed by the project inspector when specifically approved by DSA.
☐	**f.** Test adhered veneer bond strength.	**Test**	**LOR**	**1410.2.1;** TMS402 Article 12.3.2.4. **(Field constructed mock-up laboratory tested in accordance with ASTMC482).**

	M3. POST-INSTALLED ANCHORS IN MASONRY:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Inspect installation of post installed anchors	**See Notes**	**SI***	**1617A.1.19, 1705A.4, Table 1705A.3 Item 4a (Continuous) & 4b (Periodic);** ACI 318-14 Sections 17.8 & 26.13. * May be performed by the project inspector when specifically approved by DSA. (See Appendix for exemptions.)

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✔	**b.** Test post-installed anchors.	**Test**	**LOR**	**1705A.4, 1910A.5.** (See Appendix for exemptions.)

	M4. OTHER MASONRY:			
	Test or Special Inspection	**Type**	**Performed By**	**Code Reference sand Notes**
☐	**a.**			

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1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISIS100-16; RCSC 2014; AWSD1.1, AWSD1.2, AWSD1.3, AWSD1.4, AWSD1.8

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	S/A1. STRUCTURAL STEEL, COLD-FORMED STEEL AND ALUMINUM USED FOR STRUCTURAL PURPOSES			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Verify identification of all materials and: • Mill certificates indicate material properties that comply with requirements. • Material sizes, type sand, grades comply with requirements.	**Periodic**	*	**Table 1705A.2.1 Item 3a–3c.** 2202A.1; AISIS100-16 Section A3.1 & A3.2, AISIS240-15 Section A3 & A5, AISIS220-15 Sections A4 & A6. * By special inspector or qualified technician when performed off-site.
✔	**b.** Test unidentified materials	**Test**	**LOR**	**2202A.1.**
✔	**c.** Examine seam welds of HSS shapes	**Periodic**	**SI**	DSA IR17-3.
✔	**d.** Verify and document steel fabrication per DSA-approved construction documents.	**Periodic**	**SI**	Not applicable to cold-formed steel light-frame construction, except for trusses (**1705A.2.4**).
☐	**e.** Buckling restrained braces.	**Test**	**LOR**	Testing and special inspections in accordance with IR22-4.

	S/A2. HIGH-STRENGTH BOLTS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Verify identification markings and manufacturer's certificates of compliance conform to ASTM standards specified in the DSA-approved documents.	**Periodic**	**SI**	**Table 1705A.2.1 Items 1a & 1b, 2202A.1;** AISC 360-16 Section A3.3, J3.1, and N3.2; RCSC 2014 Section 1.5 & 2.1; DSA IR17-8 & DSA IR17-9.
✔	**b.** Test high-strength bolts, nuts, and washers.	**Test**	**LOR**	**Table 1705A.2.1 Item 1c, 2213A.1**; RCSC 2014 Section 7.2; DSA IR 17-8.
✔	**c.** Bearing-type ("snug tight") connections.	**Periodic**	**SI**	**Table 1705A.2.1 Item 2a, 1705A.2.6, 2204A.2**; AISC 360-16 J3.1, J3.2, M2.5 & N5.6; RCSC 2014 Section 9.1; DSA IR17-9.
✔	**d.** Pretensioned and slip-critical connections.	*	**SI**	**Table 1705A.2.1 Items 2b & 2c, 1705A.2.6, 2204A.2;** AISC 360-16 J3.1, J3.2, M2.5 & N5.6; RCSC 2014 Sections 9.2 & 9.3; DSA IR17-9. * "Continuous" or "Periodic" depends on the tightening method used.

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1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISIS100-16; RCSC 2014; AWSD1.1, AWSD1.2, AWSD1.3, AWSD1.4, AWSD1.8

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	S/A3. WELDING:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Verify weld filler material identification markings per AWS designation listed on the DSA-approved documents and the WPS.	**Periodic**	**SI**	**1705A.2.5, Table 1705A.2.1 Items 4 & 5**; AWSD1.1 and AWSD1.8 for structural steel; AWSD1.2 for Aluminum; AWSD1.3 for cold-formed steel; AWSD1.4 for reinforcing steel; DSA IR17-3.
✔	**b.** Verify weld filler material manufacturer's certificate of compliance.	**Periodic**	**SI**	DSA IR17-3.
✔	**c.** Verify WPS, welder qualifications, and equipment.	**Periodic**	**SI**	DSA IR17-3.

	S/A4. SHOPWELDING (INADDITION TOSECTIONS/A3):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Inspect groove welds, multi-pass fillet welds, single pass fillet welds > 5/16", plug and slot welds.	**Continuous**	**SI**	**Table 1705A.2.1 Items 5a.1–4;** AISC360-16 (and AISC341-16 as applicable); DSA IR17-3.
✔	**b.** Inspect single-pass fillet welds ≤ 5/16", floor and roof deck welds.	**Periodic**	**SI**	**1705A.2.2, Table 1705A.2.1 Items 5a.5 & 5a.6;** AISC360-16 (and AISC341-16 as applicable); DSA IR17-3.
✔	**c.** Inspect welding of stairs and railing systems.	**Periodic**	**SI**	**1705A.2.1**; AISC360-16 (and AISC341-16 as applicable); AWSD1.1 & D1.3; DSA IR17-3.
✔	**d.** Verification of reinforcing steel weldability other than ASTM A706.	**Periodic**	**SI**	**1705A.3.1**; AWSD1.4; DSA IR17-3. Verify carbon equivalent reported on mill certificates.
✔	**e.** Inspect welding of reinforcing steel.	**Continuous**	**SI**	**Table 1705A.2.1 Item 5b, 1705A.3.1, Table 1705A.3 Item 2, 1903A.8;** AWSD1.4; DSA IR17-3.

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	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A5. FIELD WELDING (IN ADDITION TO SECTION S/A3):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Inspect groove welds, multi-pass fillet welds, single pass fillet welds > 5/16", plug and slot welds.	**Continuous**	**SI**	**Table 1705A.2.1 Items 5a.1–4;** AISC360-16 (AISC341-16 as applicable); DSA IR17-3.
✔	**b.** Inspect single-pass fillet welds ≤ 5/16".	**Periodic**	**SI**	**Table 1705A.2.1 Item 5a.5;** AISC360-16 (AISC341-16 as applicable); DSA IR17-3.
✔	**c.** Inspect end-welded studs (ASTM A-108) installation (including bend test).	**Periodic**	**SI**	**2213A.2**; AISC360-16 (AISC341-16 as applicable); AWSD1.1; DSA IR 17-3.
✔	**d.** Inspect floor and roof deck welds.	**Periodic**	**SI**	**1705A.2.2, Table 1705A.2.1 Item 5a.6;** AISC360-16 (AISC341-16 as applicable); AWSD1.3; DSA IR17-3.
✔	**e.** Inspect welding of structural cold-formed steel.	**Periodic**	**SI***	**1705A.2.5; AWSD1.3; DSA IR 17-3.** The quality control provisions of AISIS240-15Chapter D shall also apply. * May be performed by the project inspector when specifically approved by DSA.
✔	**f.** Inspect welding of stairs and railing systems.	**Periodic**	**SI***	**1705A.2.1;** AISC360-16 (AISC341-16 as applicable); AWSD1.1 & D1.3; DSA IR17-3. * May be performed by the project inspector when specifically approved by DSA.
✔	**g.** Verification of reinforcing steel weldability.	**Periodic**	**SI**	**1705A.3.1**; AWSD1.4; DSA IR17-3. Verify carbon equivalent reported on mill certificates.
✔	**h.** Inspect welding of reinforcing steel.	**Continuous**	**SI**	**Table 1705A.2.1 Item 5b, 1705A.3.1, Table 1705A.3 Item 2, 1903A.8;** AWSD1.4; DSA IR17-3.

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1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISIS100-16; RCSC 2014; AWSD1.1, AWSD1.2, AWSD1.3, AWSD1.4, AWSD1.8

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	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A6. NONDESTRUCTIVE TESTING:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Ultrasonic	**Test**	**LOR**	**1705A.2.1, 1705A.2.5;** AISC341-16 J6.2, AISC360-16 N5.5; ANSI/ASNTCP-189, SNT-TC-1A; AWSD1.1, AWS D1.8; DSA IR 17-2.
✔	**b.** Magnetic Particle	**Test**	**LOR**	**1705A.2.1, 1705A.2.5;** AISC341-16 J6.2, AISC360-16 N5.5; ANSI/ASNTCP-189, SNT-TC-1A; AWSD1.1, AWSD1.8; DSA IR 17-2.
☐	**c.**	**Test**	**LOR**	

	S/A7. STEEL JOISTSAND TRUSSES:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Verify size, type, and grade for all chord and web members as well as connectors and weld filler material; verify joist profile, dimensions, and camber (if applicable); verify all weld locations, lengths, and profiles; mark or tag each joist.	**Continuous**	**SI**	**1705A.2.3, Table 1705A.2.3;** AWSD1.1; DSA IR22-3 for steel joists only. **1705A.2.4;** AWSD1.3 for cold-formed steel trusses.

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1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISIS100-16; RCSC 2014; AWSD1.1, AWSD1.2, AWSD1.3, AWSD1.4, AWSD1.8

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	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A8. SPRAY APPLIED FIRE-PROOFING:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Examine structural steel surface conditions, inspect application, take samples, measure thickness, and verify compliance of all aspects of application with DSA-approved documents.	**Periodic**	**SI**	**1705A.14.**
☐	**b.** Test bond strength.	**Test**	**LOR**	**1705A.14.6.**
☐	**c.** Test density.	**Test**	**LOR**	**1705A.14.5.**

	S/A9. ANCHOR BOLTS AND ANCHOR RODS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
✔	**a.** Anchor Bolts and Anchor Rods	**Test**	**LOR**	Sample and test anchor bolts and anchor rods not readily identifiable per procedures noted in DSA IR17-11.
✔	**b.** Threaded rod not used for foundation anchorage.	**Test**	**LOR**	Sample and test threaded rods not readily identifiable per procedures noted in DSA IR17-11.

	S/A10. Other Steel			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.**			

Appendix: Work Exempt from DSA Requirements for Structural Tests / Special Inspections

Application Number: 03-122864	**School Name:** Temple Academy	**School District:** Hacienda La Puente Unified School District
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Exempt items given in DSA IRA-22 or the 2019 CBC (including DSA amendments) and those items identified below with a check mark by the design professional are NOT subject to DSA requirements for the structural tests / special inspections noted. **Items marked as exempt shall be identified on the approved construction documents**. The project inspector shall verify all construction complies with the approved construction documents.

	SOILS:
☐	1. Deep foundations acting as a cantilever footing designed based on minimum allowable pressures per CBC Table 1806A.2 and having no geotechnical report for the following cases: A) free standing sign or scoreboard, B) cell or antenna towers and poles less than 35'-0" tall (e.g., lighting poles, flag poles, poles supporting open mesh fences, etc.), C) single-story structure with dead load less than 5 psf (e.g., open fabric shade structure), or D) covered walkway structure with an apex height less than 10'-0" above adjacent grade.
☐	2.Shallow foundations, etc. are exempt from special inspections and testing by a Geotechnical Engineer for the following cases: A) buildings without a geotechnical report and meeting the exception item #1 criteria in CBC Section 1803A.2 supported by native soil (any excavation depth) or fill soil (not exceeding 12" depth per CBC Section 1804A.6),B) soil scarification/re-compaction not exceeding 12" depth, C) native or fill soil supporting exterior non-structural flatwork (e.g., sidewalks, site concrete ramps, site stairs, parking lots, driveways, etc.), D) unpaved landscaping and playground areas, or E) utility trench backfill.

	CONCRETE/MASONRY:
☐	1.Post-installed anchors for the following: A) exempt non-structural components (e.g., mechanical, electrical, plumbing equipment - see item 7 for "Welding" in the Appendix below) given in CBC Section 1617A.1.18 (which replaces ASCE7-16, Section 13.1.4) or B) interior nonstructural wall partitions meeting criteria listed in exempt item 3 for "Welding."
☐	2.Concrete batch plant inspection is not required for items given in CBC Section 1705A.3.3.2 subject to the requirements and limitations in that section.
☐	3. Non-bearing non-shear masonry walls may be exempt from certain DSA masonry testing and special inspection items as allowed per DSA IR21-1.16. Refer to construction documents for specific exemptions accordingly for each applicable wall condition.
☐	4.Epoxy shear dowels in site flatwork and/or other non-structural concrete.

Appendix: Work Exempt from DSA Requirements for Structural Tests / Special Inspections

Application Number:
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	CONCRETE/MASONRY:
☐	5. Testing of reinforcing bars is not required for items given in CBC Section 1910A.2 subject to the requirements and limitations in that section.

	WELDING:
☐	1. Solid-clad and open-mesh fences, gates with maximum leaf span of 10', and gates with a maximum rolling section of 10' all having an apex height less than 8'-0" above lowest adjacent grade. When located above circulation or occupied space below, these gates/fences are not located within 1.5x gate/fence height (max 8'-0") to the edge of floor or roof.
☐	2. Handrails, guardrails, and modular or relocatable ramps associated with walking surfaces less than 30" above adjacent grade (excluding post base connections per the 'Exception' language in Section 1705A.2.1); fillet welds shall not be ground flush.
☐	3. Non-structural interior cold-formed steel framing spanning less than 15'-0", such as in interior partitions, interior soffits, etc. supporting only self-weight and light-weight finishes or adhered tile, masonry, stone, or terra cotta veneer no more than 5/8" thickness and apex less than 20'-0" in height and not over an exit way. Maximum tributary load to a member shall not exceed the equivalent of that occurring from a 10'x10' opening in a 15' tall wall for a header or king stud.
☐	4. Manufactured support frames and curbs using hot rolled or cold-formed steel (i.e., light gauge) for mechanical, electrical, or plumbing equipment weighing less than 2000# (equipment only) (connections of such frames to superstructure elements using welding will require special inspection as noted in selected item(s) for Sections S/A3, S/A4 and/or S/A5 of listing above).
☐	5. Manufactured components (e.g., Tolco, B-Line, Afcon, etc.) for mechanical, electrical, or plumbing hanger support and bracing (connections of such components to superstructure elements using welding will require special inspection as noted in selected item(s) for Sections S/A3, S/A4 and/or S/A5 of listing above).
☐	6. TV Brackets, projector mounts with a valid listing (see DSA IRA-5) and recreational equipment (e.g., playground structures, basketball backstops, etc.) (connections of such elements to superstructure elements using welding will require special inspection as noted in selected item(s) for sections S/A3, S/A4 and/or S/A5 located in the Steel/Aluminum category).
☐	7. Any support for exempt non-structural components given in CBC Section 1617A.1.18 (which replaces ASCE7-16, Section 13.1.4) meeting the following: A) when supported on a floor/roof, <400# and resulting composite center of mass (including component's center of mass) ≤4' above supporting floor/roof, B) when hung from a wall or roof/floor, <20# for discrete units or <5 plf for distributed systems.

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIALINSPECTIONS (SIGNATURE), 2019 CBC

Application Number:	School Name:	School District:
03-122864	Temple Academy	Hacienda La Puente Unified School District
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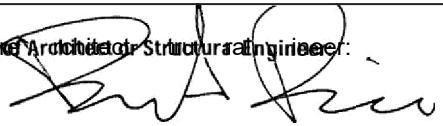
Name of Architect or Engineer in general responsible charge:

Richard Ingrassia

Name of Structural Engineer (When structural design has been delegated):

Frank Rice

Signature of Architect or Structural Engineer:  Date: 6/14/2023

Note: To facilitate DSA electronic mark-ups and identification stamp application, DSA recommends against using secured electronic or digital signatures.

DSASTAMP

DSA 103-19: LIST OF REQUIRED VERIFIED REPORTS, CBC 2019

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1. Soils Testing and Inspection: Geotechnical Verified Report Form DSA 293
2. Structural Testing and Inspection: Laboratory Verified Report Form DSA 291
3. Concrete Batch Plant Inspection: Laboratory Verified Report Form DSA 291
4. Post-installed Anchors: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
5. Masonry Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
6. Shop Welding Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
7. Field Welding Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
8. High-Strength Bolt Installation Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities, construction facilities and temporary controls to be provided, maintained, relocated, and removed by CONTRACTOR.

B. Temporary office furnishings and office equipment.

1.02 QUALITY ASSURANCE

A. CONTRACTOR shall comply with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building Code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department, and rescue squad requirements.
5. Environmental protection regulations.

B. CONTRACTOR shall arrange for the inspection and testing of each temporary utility prior to use. Obtain required certifications and permits and transmit to CONSTRUCTION MANAGER.

C. CONTRACTOR provided facilities are to be in place and available for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT use and occupancy following the date of issue of the Notice to Proceed and shall remain in place and available for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT use and occupancy throughout the full term of the Contract.

1.03 SUBMITTALS

A. Temporary Utilities: Submit to CONSTRUCTION MANAGER reports of tests, inspections, meter readings, certifications, permits, and similar procedures performed on temporary utilities.

1.04 CONTRACTOR PROVIDED FACILITIES

A. CONTRACTOR shall provide and connect electric and water meters to the utility point of connections at each on-site office space and reimburse the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT for their consumption. CONTRACTOR shall coordinate all utilities hook-up for the CONTRACTOR'S site office space with the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT CONSTRUCTION MANAGER.

B. CONTRACTOR shall provide and maintain the Fire Alarm System per Project Specifications, when applicable.

C. CONTRACTOR shall provide all materials, equipment, labor and all other incidental material, tools, appliances, and transportation as required for a complete and functional video surveillance system (VSS) during construction. The CONTRACTOR shall maintain the VSS, and the system shall be manufactured for the intended purpose in a commercial/industrial, 24 hours day, seven (7) days per week, and 365 days per year operating environment and shall have coverage of the entire project site and the perimeter. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and CONSTRUCTION MANAGER shall be granted access to the live feed from VSS.

D. CONTRACTOR shall provide all materials, equipment, labor, licenses, and all other incidentals for a fly-by unmanned aerial vehicle (UAV)/drone footage of the entire project (min ½ hour) every month. The CONTRACTOR shall make available all UAV-captured photos, videos, and panoramas to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and CONSTRUCTION MANAGER.

1.05 TEMPORARY UTILITIES

A. See Specification Section 01 50 00, Construction Facilities and Temporary Controls.

B. CONTRACTOR shall arrange for and provide temporary connections of utilities such as water service, sanitary facilities, etc., as specified herein and shall inspect HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT facilities to determine the capacity and operation of services provided by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT are adequate for the execution of the work. The cost for connection to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT supplied temporary power panel board located on the temporary power pole and electrical power distribution to the CONTRACTOR'S work areas are the responsibility of the CONTRACTOR.

C. CONTRACTOR shall furnish, install, and pay for all necessary permits, inspections, move ins/out, temporary lines, connections and fees, extensions and distribution, metering devices and use charges, deliveries/pickups, rentals, storage, transportation, taxes, labor, insurance, bonds, material, equipment, and all other miscellaneous items for the temporary utility systems.

D. CONTRACTOR shall pay to utility companies for the consumption of the following temporary utility services:

1. Temporary Water service.
2. Temporary Electrical service.
3. Temporary Gas service.
4. Temporary Telephone and Data.

E. Maintain, extend and/or relocate temporary utility systems as rapidly as required in order to provide for progress of the Work.

1. Water distribution piping and outlet devices shall be of the size and required flow rates in order to provide service to all areas of the Project site.

2. Furnish, install, maintain, extend, and distribute temporary electric area distribution boxes, so located that individual trades can obtain adequate power and artificial lighting, at all points required for the Work, for inspection and for safety.

   a. Provide 20-foot candles minimum lighting levels inside building(s) and 5-foot candles outside for safety and security.

   b. Ensure welding equipment is supplied by electrical generators.

3. Provide temporary Heating, Ventilation, and Air Conditioning. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will not accept utilization of the permanent HVAC system for temporary HVAC until Completion. CONTRACTOR shall maintain manufacturer required levels of room and/or space temperature, humidity, and ventilation necessary to install products, materials and/or systems, cure materials, disperse humidity, remove fumes, and prevent accumulation of dust, irritants, or gases.

4. Provide temporary phone, data service, and distribution to Project site temporary offices.

F. Upon Completion of the Work, remove temporary systems, devices, and appurtenances.

1.06 TEMPORARY OFFICES

A. CONTRACTOR shall provide Project Site temporary office facilities for his own use for the duration of the Work. CONTRACTOR shall submit construction trailer layout plan to CONSTRUCTION MANAGER for approval before mobilizing the trailers to the site. CONTRACTOR shall provide the necessary materials and labor to provide the trailer with access for disabled persons on request by the CONSTRUCTION MANAGER. Trailer shall include, at a minimum, the following:

1. An open work area with devising partitions with working desk, chair, electrical, and data outlets at each workstation.

2. One (1) restroom for Male and one (1) restroom for Female. Provide and replenish toiletry supplies and cleaning once per week.

3. Provide and maintain heavy duty shoe scraper mats at the exterior doors and Black Trapper mats at the interior doors.

B. Trailer shall have ample headroom, 8-foot minimum, and shall be lighted, heated, ventilated, and air-conditioned.

C. At CONTRACTOR'S expense and without limitation remove and/or relocate temporary office(s) and related facilities as rapidly as required in order to provide for progress of the Work.

D. CONTRACTOR shall remove waste bin trash, vacuum, and mop trailer floors once per week. Provide trailer with bathroom paper goods, soap, broom, mop, and doormats.

E. Trailer shall remain property of CONTRACTOR. CONTRACTOR shall remove such property upon Completion of Work or as otherwise determined in writing by CONSTRUCTION MANAGER.

1.07 FURNISHINGS

A. CONTRACTOR shall provide desks, tables and chairs and other furnishings could be new or used but in good condition, shall set in rooms, and shall position as necessary.

B. Unless otherwise noted in this Section, furniture shall remain property of CONTRACTOR. CONTRACTOR shall remove such property upon Completion of Work or as otherwise determined in writing by CONSTRUCTION MANAGER.

1.08 TEMPORARY STORAGE UNITS

A. CONTRACTOR shall provide secure and waterproof storage units for the temporary storage of furniture, equipment and other items requiring protection.

B. Walls, roof, and doors shall be a minimum of 16-gauge steel with floors of 1 inch tongue and groove hardwood or ¾ inch minimum exterior type plywood. The undercarriage shall be designed to accommodate forklift blades 42-inch to 60-inch long. There shall be doublewide swing out lockable doors at one end equipped with waterproof gaskets.

C. CONTRACTOR shall be responsible for delivery charges and will install the storage unit in an appropriate area.

D. CONTRACTOR shall remove the storage unit from the Project site when the storage unit is no longer required for the Work or upon Completion of the Work.

E. CONTRACTOR shall at their expense and without limitation remove and/ or relocate storage units as rapidly as required in order to provide for progress of the Work.

1.09 TEMPORARY SANITARY FACILITIES

A. CONTRACTOR shall provide portable chemical toilet facilities. Quantity of portable chemical toilet facilities shall be based on total number of workers and shall be in accordance with CAL/OSHA standards.

B. Portable chemical toilet facilities shall be maintained with adequate supplies and in a clean and sanitary condition and shall be removed from the Project site upon Completion of the Work. CONTRACTOR shall always keep both HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT chemical toilet facilities and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT trailer/field office restroom clean and operational.

C. CONTRACTOR employees shall not use school toilet facilities.

D. At CONTRACTOR'S expense and without limitation remove and/or relocate portable chemical toilet facilities as rapidly as required in order to provide for progress of the Work.

E. CONTRACTOR will contain their breaks and lunch periods to the areas designated by CONTRACTOR. CONTRACTOR shall provide a suitable container within the break/lunch area for the placement of trash. Areas used for break/lunch must be maintained clean and orderly. Once finish flooring has been installed in a particular area, no food or beverages will be permitted in that area.

1.10 FIRE PROTECTION

A. Fire Protection Responsibility: Protection of Project from fire shall be solely CONTRACTOR'S responsibility.

B. Fire Protection Provisions, General: Maintain, at a minimum, the Work in conditions to minimize fire hazards and provide adequate fire protection devices, such as suitable fire extinguishers, blankets, warning signs and storage containers.

1. Store combustible materials in containers in fire-safe locations.

2. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

3. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

C. Special Fire Protection Provisions: During hazardous construction activities, maintain adequate fire protection devices immediately available for use at the location of such activities.

D. Fire Protection Equipment: Until fire protection is provided by permanent fire protection systems and equipment, install, and maintain temporary fire protection equipment as necessary to protect against ignition and spread of fires. Comply with NFPA 10 "Standard for Portable Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alteration and Demolition Operations."

E. Fire Extinguishers for Protection During Construction: Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

1. Provide hand carried, portable UL-rated, Class "A" fire extinguishers for temporary offices and similar spaces.

2. In other locations, provide hand-carried, portable, UL-rated, Class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

F. Installation of Fire Extinguishers for Protection During Construction: Locate fire extinguishers in field offices, storage sheds, tool houses, other temporary buildings and throughout the Work site. Comply with directions of Fire Marshal having jurisdiction.

1. In the area under construction, provide at least one (1) fire extinguisher for each 5,000 square feet of building floor area.

2. Locate fire extinguishers no greater than 100 feet travel distance apart.

1.11 TEMPORARY STORAGE YARDS

A. CONTRACTOR shall fence and maintain storage yards in an orderly manner.

B. Provide storage units for materials that cannot be stored outside.

C. At CONTRACTOR'S expense and without limitation remove and/or relocate storage yards and units as rapidly as required in order to provide for progress of the Work.

1.12 TEMPORARY DE-WATERING FACILITIES AND DRAINAGE

A. For temporary drainage and de-watering facilities and operations not directly associated with construction activities included under individual sections, comply with de-watering requirements of applicable Division 01 sections. CONTRACTOR shall maintain the Work, Project site and related areas free of water.

B. For temporary drainage and de-watering facilities and operations directly associated with new buildings, additions, or other construction activities, comply with all sections of the Project Specifications. CONTRACTOR shall be responsible for, but not limited to, de-watering of excavations, trenches and below grade areas of buildings, structures, the Project site, and related areas.

1.13 TEMPORARY PROTECTION FACILITIES INSTALLATION

A. CONTRACTOR shall not change over from using temporary facilities and controls to permanent facilities until Completion, except as permitted by CONSTRUCTION MANAGER.

B. Until permanent fire protection needs are supplied and approved by authorities having jurisdiction, CONTRACTOR shall provide, install, and maintain temporary fire protection facilities of the types needed in order to adequately protect against fire loss. CONTRACTOR shall adequately supervise welding operations; combustion type temporary heating, and similar sources of fire ignition.

C. CONTRACTOR shall provide, install, and maintain substantial temporary enclosures of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Where materials, tools and equipment are stored within the Work area, CONTRACTOR shall provide secure lock up to protect against vandalism, theft, and similar violations of security. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT accepts no financial responsibility for loss, damage, vandalism, or theft.

D. CONTRACTOR operations shall not block, hinder, impede, or otherwise inhibit the use of required exits and/or emergency exits to the public way, except as approved by CONSTRUCTION MANAGER. CONTACTOR shall maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for firefighting equipment and/or personnel.

E. With approval of CONSTRUCTION MANAGER and at the earliest feasible date in each area of the Work, complete installation of the permanent fire protection facilities including connected services and place into operation and use. Instruct HACIENDA LA PUENTE UNIFIED DISTRICT personnel in use of permanent fire protection facilities.

F. In the event of an emergency drill or an actual emergency, designated by the sounding of the fire alarm and/or other sounding device, all construction activities must cease. CONTRACTOR shall evacuate the Work area and remain outside the Work area until permitted to return. No Work shall be conducted during the evacuation of a building or during an emergency.

1.14 PROTECTION OF EXISTING CONDITIONS

A. Protection of Adjacent Facilities: CONTRACTOR shall restrict Work to limits indicated on the Drawings and as specified in Section 01 11 00 - Summary of the Work. Protect existing, adjacent facilities from damage, including soiling and debris accumulation.

B. Video Record of Existing Conditions: CONTRACTOR shall produce video record of all existing conditions within and adjacent to Project area.

1. Digital Video record shall made on flash drives with sound to record comments to identify locations and describe conditions.

2. CONSTRUCTION MANAGER will accompany CONTRACTOR during recording of existing conditions but will not direct recording process.

3. Video shall record state of existing features, including but not limited to:

a. Paving.
b. Landscaping.
c. Building surfaces.
d. Utilities.
e. Lighting standards, fencing, signage, and other site appurtenances.

4. CONTRACTOR shall retain one (1) copy and deliver one (1) copy of video record to CONSTRUCTION MANAGER within seven (7) calendar days after the video record was produced.

5. Video record shall be used to verify restoration of existing conditions after completion of construction activities.

6. Existing feature not recorded shall be restored as directed by CONSTRUCTION MANAGER, including reconstruction, and refinishing as determined necessary by CONSTRUCTION MANAGER.

1.15 PUBLICITY RELEASES

A. CONTRACTOR shall not release any information, story, photograph, plan, or drawing relating to information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s).

1.16 TRENCHES

A. Open trenches for installation of utility lines (water, gas, electrical, and similar utilities) and open pits outside barricaded working areas shall be barricaded at all times in a legal manner determined by CONTRACTOR. Trenches shall be backfilled and patch-paved within twenty-four (24) hours after approval of installation by authorities having jurisdiction or shall have "trench plates" installed. Required access to buildings shall be provided and maintained. CONTRACTOR shall comply with all applicable statutes, codes, and

regulations regarding trenching and trenching operations. Open trenches deeper than 3'-6", and not located within a public street access, shall be enclosed within an 8'-0" high chain-link fence.

1.17 DUST CONTROL

A. CONTRACTOR is responsible for dust control on and off the Project site. When Work operations produce dust the Project site and/or streets shall be sprinkled with water to minimize the generation of dust. CONTRACTOR shall clean all soils and debris from construction vehicles and cover both earth and debris loads prior to leaving the Project site. CONTRACTOR shall, on a daily basis, clean all streets and/or public improvements within the right of way of any and all debris, dirt, mud and/or other materials attributable to operations of CONTRACTOR.

1.18 WASH OUT

A. CONTRACTOR shall provide and maintain a minimum of four (4) wash out boxes of sufficient size and strength to provide for concrete mixer wash out. CONTRACTOR shall locate and relocate both the wash out boxes and wash out areas in order to accommodate the progression of the Work. The wash out area shall be located as to minimize the amount of potential run off onto adjacent private and/or public property. CONTRACTOR shall legally dispose of the contents of the wash out boxes and area on an as needed basis or as required by CONSTRUCTION MANAGER.

1.19 WASTE DISPOSAL

A. CONTRACTOR shall provide and maintain trash bins on the Project site. Trash bins shall be serviced on an as needed basis and CONTRACTOR is responsible for the transportation of and the legal disposal of all contents.

1.20 ADVERSE WEATHER CONDITIONS

A. Should warnings of adverse weather conditions such as heavy rain and/or high winds be forecasted, CONTRACTOR shall provide every practical precaution to prevent damage to the Work, Project site and adjacent property. CONTRACTOR precautions shall include, but not be limited to, enclosing all openings, removing and/or securing loose materials, tools, equipment, and scaffolding.

B. CONTRACTOR shall provide and maintain drainage away from buildings and structures.

C. CONTRACTOR shall implement all required storm water mitigation measures as required under related Division 01 Sections.

1.21 DAILY AND MONTHLY REPORTS

A. CONTRACTOR shall provide and maintain in the Project site office of CONTRACTOR, a daily sign in sheet for use by all employees of CONTRACTOR and all SUB-CONTRACTORS at whatever tier. At the beginning of each workday, the foreman, project manager, superintendent of CONTRACTOR and/or SUB-CONTRACTORS shall visit the site office of CONTRACTOR and shall enter onto the daily sign in sheet: all employee names; trade classification; and represented company. The completed sign in sheet shall serve as the basis of and shall be submitted with the daily construction report as set forth in Paragraph B below.

B. By the end of each workday, CONTRACTOR shall submit to CONSTRUCTION MANAGER and INSPECTOR a daily construction report denoting the daily manpower counts and a brief description/location of the workday activities. Manpower shall be broken down by trade classification such as foreman, journeyman, or apprentice. The report shall also note the date, day of the week, weather conditions, deliveries, equipment on the Project site

whether active and/or idle, visitors, inspections, accidents and unusual events, meetings, stoppages, losses, delays, shortages, strikes, orders and requests of governing agencies, Construction Directive and/or Change Orders received and implemented, services disconnected and/or connected, equipment start up or tests and partial use and/or occupancies. CONTRACTOR shall also include on the daily construction report the above information for all SUB-CONTRACTORS at whatever tier.

C. CONTRACTOR shall submit on a monthly basis certifying CEQA Mitigations and Storm Water Pollution Prevention (SWPPP) compliance.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 55 00

SITE LOGISTICS PLAN

PART 1 - GENERAL

1.01 SUMMARY

A. Provide all material, labor, and equipment necessary to perform the work as shown on Drawings and as specified herein.

B. This Section includes:

1. Approved access roads to and from the project site and work areas.
2. Approved equipment staging and parking areas.

1.02 REFERENCES

A. General

1. The publication listed below forms a part of this specification to the extent referenced.

2. Refer to the latest edition available on the date of the Notice Inviting Bids shall be used.

3. CONTRACTOR shall abide by Authority Having Jurisdiction (AHJ) for all Traffic Controls and regulations requirements.

1.03 SUBMITTALS

A. Site Logistics Plan. See Specifications Section 01 33 00, Submittal Procedures. CONTRACTOR shall prepare and submit for review by CONSTRUCTION MANAGER a site logistics plan indicating detailed layout of CONTRACTOR Staging Area, including:

A. Temporary utilities

B. Temporary fencing and gates

C. Temporary offices and sheds

D. Construction aids

E. Vehicular accessways and on-site parking

F. Temporary barriers and enclosures

G. Storm water pollution prevention measures

B. Provide a traffic control plan prior to commencement of construction. This plan shall outline flagging procedures and delivery/movement timing so as to avoid peak traffic periods. The plan shall also outline procedures for notifying the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Security of forthcoming lane or roadway closures. Allow HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Security to modify emergency response plans and notify other public service providers (such as The City's Fire Department) of closures as required.

1.04 ACCESS TO THE WORK SITE

A. CONTRACTOR shall coordinate with CONSTRUCTION MANAGER regarding site access. CONTRACTOR shall provide contact information for a representative during construction and for the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT during long-term maintenance. CONTRACTOR shall provide a construction and site access schedule to CONSTRUCTION MANAGER.

B. The CONTRACTOR'S use of existing access roads will be prohibited or limited where shown on Drawings.

C. CONTRACTOR shall coordinate with CONSTRUCTION MANAGER to become familiar with the terms of the use permit and shall comply with the use permit for the duration of the work.

D. Working hours are generally 6:30 AM to 4:30 PM, Monday through Friday. Weekend hours may be allowed when approved by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and in compliance with The City requirements.

E. The CONTRACTOR'S employees shall park within the worksite as shown on HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S Site Logistic Plan. All deliveries shall be coordinated through the CONSTRUCTION MANAGER.

F. CONTRACTOR shall provide legal access to and maintain CONTRACTOR designated areas for the legal parking, loading, off-loading and delivery of all vehicles associated with the Work.

G. CONTRACTOR shall be solely responsible for providing and maintaining these requirements whether on or off the Project site. CONTRACTOR shall provide and maintain ample on-site parking spaces designated for the exclusive use of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and CONSTRUCTION MANAGER team. CONTRACTOR shall erect signs as required by CONSTRUCTION MANAGER each of these spaces and prevent all unauthorized vehicles from parking in the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and CONSTRUCTION MANAGER team -reserved spaces.

H. CONTRACTOR shall provide unimpeded access for emergency vehicles. CONTRACTOR shall maintain 20-foot (6 m) width driveways with turning space between and around combustible materials.

I. CONTRACTOR shall provide and maintain access to fire hydrants free of obstructions.

1.05 TRAFFIC CONTROL

A. The CONTRACTOR shall be responsible for the safe movement of vehicular traffic to and from the worksite and during operations, including traffic control measures required to ensure safe passage of vehicles and equipment.

B. The control shall be in accordance with CCR Title 8.

1. At least one (1) flagman shall be provided at the entrance and Exit during periods when the CONTRACTOR'S vehicular activity may conflict with other traffic along roads.

2. The flagman shall ensure that the right-of-way is granted to loaded vehicles and shall provide for safety of all users of the road.

C. The Traffic control and signage shall be in accordance with Manual of Traffic Controls for Construction and Maintenance Work Zones.

D. CONTRACTOR shall provide temporary signs and signals as required by authorities having jurisdiction and in compliance with HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S requirements transmitted through CONSTRUCTION MANAGER. CONTRACTOR shall relocate signs and signals as necessary during construction.

1.06 HAUL ROUTES

A. If a permit is required by local authorities for off-site hauling of materials, the CONTRACTOR shall prepare the truck-routing plan, obtain the permit, and submit a copy of the permit to the CONSTRUCTION MANAGER before off-site hauling begins.

B. The plan shall include provisions for cleaning soil and rock from surrounding streets, and other paved roads that may become dirty due to hauling operations, and disposal of those items.

C. Comply with weight restrictions on all roads.

D. The CONTRACTOR shall inform the CONSTRUCTION MANAGER and local authorities when hauling operations are to begin and end.

1.07 TIRE DECONTAMINATION

A. See Erosion Control Plan.

B. Vehicles, excavation, and hand-held equipment will be decontaminated prior to leaving the site.

C. A decontamination area will be prepared on site prior to impacted-soil excavation. This area will be designed to contain liquids and residue generated during the decontamination process. The decontamination area will be in an area easily accessible to incoming and outgoing vehicles and equipment and within proximity to the excavation areas.

D. Decontamination procedures will include methods for removing soil from vehicle tires, such as shaker plates located at the site exit and hand-brushing of tires. In addition, personnel overseeing decontamination procedures will be responsible for ensuring soil is not tracked off site.

1.08 ACCESS ROADS

A. Throughout the entire Contract period, the CONTRACTOR shall share access roads, both those constructed by the CONTRACTOR or otherwise provided for CONTRACTOR'S use whose work is adjacent to the CONTRACTOR'S work.

1. Coordination with others shall be the responsibility of the CONTRACTOR. In case of conflicts or disputes, the CONSTRUCTION MANAGER'S decision will be final.

2. The CONTRACTOR shall not construct new access roads.

3. The CONTRACTOR shall provide dust control on access roads used in CONTRACTOR operations and on those roads subject to dust because of conditions created by the work.

a. Roads shall be sprayed by water truck at least twice daily or more frequently during haul operations.

b. CONTRACTOR shall limit driving speed on access roads to keep dust down.

4. If on-site access roads become damaged during the work, the CONTRACTOR shall promptly repair them with equivalent surfacing.

1.09 PARKING

A. On-site parking areas for CONTRACTOR personnel shall be limited to the staging areas shown on Drawings.

1. The CONTRACTOR'S personnel, suppliers, and delivery vehicles shall not block access roads.

1.10 CONTRACTOR STAGING AREA REQUIREMENTS

A. CONTRACTOR Staging Areas: Refer to reference drawings included in the set of Contract Drawings for location of CONTRACTOR Staging Areas.

1. CONTRACTOR shall use only site areas designated specifically by CONSTRUCTION MANAGER as CONTRACTOR Staging Area for the Project.

2. CONTRACTOR Staging Area for the Project shall be clearly delineated by means of signage. CONTRACTOR shall remove equipment placed or located outside of areas designated for CONTRACTOR Staging Area to within CONTRACTOR Staging Area at no change in Contract Time and Contract Sum.

3. CONTRACTOR shall keep access to CONTRACTOR Staging Areas and other construction access ways and thoroughfares clear at all times. CONTRACTOR shall provide traffic and parking control signage acceptable to CONSTRUCTION MANAGER.

B. Cleanliness: CONTRACTOR shall keep CONTRACTOR Staging Area clear of trash and debris and in neat order. CONTRACTOR shall be responsible for cleanliness and order of assigned CONTRACTOR Staging Areas, as acceptable to CONSTRUCTION MANAGER.

1.11 REMOVAL OF CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

A. Removal of Construction Facilities and Temporary Controls: Unless otherwise mutually agreed by CONSTRUCTION MANAGER and CONTRACTOR, CONTRACTOR shall remove temporary materials, equipment, services, and construction prior to Contract Completion review.

B. Cleaning and Repairs: CONTRACTOR shall clean, and repair damage caused by installation or use of temporary facilities on public and private rights-of-way.

C. Removal of Temporary Utilities and Restoration: CONTRACTOR shall remove temporary underground utility installations to a depth of two (2) feet. Backfill, compact, and regrade site as necessary to restore areas or to prepare for indicated paving and landscaping.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 56 00

TEMPORARY BARRIERS AND ENCLOSURES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes General Requirements for:

1. Safety and protection of Work.

2. Safety and protection of existing HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT property, including adjacent private property.

3. Barriers.

4. Security.

5. Environmental controls.

6. Protection of completed Work.

7. Removal of construction facilities and temporary controls.

1.02 DEFINITIONS

A. Section 01 42 10 - Definitions.
B. Section 01 50 00 - Construction Facilities and Temporary Controls.
C. Section 01 55 00 - Site Logistic Plan.
D. Section 01 54 10 - Security and Safety Measures.

1.03 CODE AND REGULATIONS

A. California Building Code (CBC): Comply with California Building Code (CBC) Chapter 33, Section 3303, Protection of Pedestrians During Construction or Demolition.

B. CONTRACTOR shall prepare a Stormwater Pollution Prevention Plan covering the work outlined in the Contract Documents.

C. Fire Regulations: Comply with requirements of fire authorities having jurisdiction, including local Authority, California Fire Code (CFC) Article 87 during performance of the Work.

D. Safety Regulations: Comply with requirements of all applicable Federal, State, and local safety rules and regulations. CONTRACTOR shall be solely responsible for jobsite safety.

E. Barricades and Barriers: As required by governing authorities having jurisdiction, provide substantial barriers, guardrails, and enclosures around Work areas and adjacent to embankments and excavations for protection of workers and the public.

1.04 STORMWATER PERMIT

A. CONTRACTOR shall follow the requirements of stormwater permit for the work covered by the Contract Documents as applicable.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 PROTECTION OF WORK AND PROPERTY

A. General

1. Construct and maintain all necessary temporary drainage and stormwater protection in accordance with the SWPPP and stormwater permit.

2. Conduct all pumping necessary to keep excavations, floors, pits, trenches, manholes, and ducts free of water throughout this Project.

3.02 BARRIERS

A. CONTRACTOR shall install temporary Project site security barricade(s) indicated on Drawings or as required for safety and as specified herein. New or used material may be furnished. Security of Project site and contents is a continuous obligation of CONTRACTOR.

B. Unless otherwise indicated or specified, security fence shall be constructed of 8-foot-high chain link fencing with a 6-foot-high windscreen. Space posts not to exceed ten feet on centers. Posts shall be of following nominal pipe dimensions: terminal, corner, and gatepost 2 ½-inch, line posts 2-inch. Chain link fence shall be not less than #13 gauge, 2-inch mesh, and in one width. Posts, fence, and accessories shall be galvanized and as follows:

1. Shall be set in the earth a depth of 24-inch with soil firmly compacted around post, unless required otherwise in writing by CONSTRUCTION MANAGER.

2. Fence fabric shall be attached to posts with #14-gauge tie wire at 16 inches on center. A #6-gauge steel tension wire with turnbuckles shall be installed at top and bottom of barricade fencing. Wire tie fabric to tension wires at 18" centers.

3. Windscreen shall be attached to fence fabric and steel tension wires at 18-inch centers with a minimum of #14-gauge tie wire. Windscreen shall be maintained and all rips, tears, missing sections shall be corrected upon notification by CONSTRUCTION MANAGER.

4. Chain link fencing shall be free from barbs, icicles or other projections resulting from galvanizing process. Fence having such defects will be replaced even if it has been installed.

5. Gates shall be fabricated of steel pipe with welded corners and bracing as required. Fence and fabric to be attached to frame at 12-inch centers. Provide all gate hardware of a strength and quality to perform satisfactorily until barricade is removed upon Completion of the Work. Each gate shall have a chain and padlock. Provide two (2) gate keys to CONSTRUCTION MANAGER. At Completion of the Work, remove barricade from Project site, backfill, and compact fence footing holes. Existing surface paving that is cut into or removed shall be patched and sealed to match surrounding areas.

6. At CONTRACTOR'S expense and without limitation remove or relocate fencing, fabric and barricades or other security and protection facilities as rapidly as required in order to provide for progress of the Work.

7. CONTRACTOR must keep the fence for an additional period of sixty (60) calendar days after the completion of the project.

3.02.1 OTHER TEMPORARY ENCLOSURES AND BARRICADES

A. Comply with applicable requirements of California Building Code (CBC) and authorities having jurisdiction, including industrial safety regulations. Review with CONSTRUCTION MANAGER.

B. Provide lockable, temporary weather-tight enclosures at openings in exterior walls to create acceptable working conditions, to allow for temporary heating and for security.

C. Provide protective barriers around trees, plants, and other improvements designated to remain.

D. Since the Work of this Project may be immediately adjacent to existing occupied structures and vehicular and pedestrian right of ways, CONTRACTOR shall, in his sole judgment and in accordance with applicable safety standards, provide temporary facilities, additional barricades, protection and care to protect existing structures, occupants, property, pedestrians and vehicular traffic. CONTRACTOR is responsible for any damage, which may occur to the property and occupants of the property of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT or adjacent private or public properties which in any way results from the acts or neglect of CONTRACTOR.

E. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting.

F. CONTRACTOR shall be responsible for cleaning up all areas adjacent to the construction site which have been affected by the construction; and for restoring them to at least their original condition- including landscaping; planting of trees, sod, and shrubs damaged by construction; and raking and disposal of debris such as roofing shingles, paper, nails, glass sheet metal, bricks, and waste concrete. Construction debris shall be removed and properly disposed of. Culverts and drainage ditches with sediment from the construction area shall be cleared routinely to maintain proper drainage and re-cleaned prior to completion of the contract.

G. Paint temporary barriers and enclosures with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard.

H. Where appropriate and necessary, provide warning lighting, including flashing red or amber lights.

I. Security Closures and Lockup: Provide substantial temporary closures of openings in exterior surfaces and interior areas as appropriate to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Provide doors with self-closing hardware and locks.

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

J. Weather Closures: Provide temporary weather-tight closures at exterior openings to prevent intrusion of water, to create acceptable working conditions, to protect completed Work and to maintain temporary heating, cooling, and ventilation. Provide access doors with self-closing hardware and locks.

K. Temporary Access, Passage, and Exit Ways: Construct temporary stairs, ramps, and covered walkways, with related doors, gates, closures, guardrails, handrails, lighting, and protective devices, to maintain access and exit ways to existing facilities to remain operational.

1. Design and location of temporary construction shall be by CONTRACTOR, subject to review by CONSTRUCTION MANAGER and authorities having jurisdiction.

2. Provide temporary lighting, illuminated interior exit signage, non-illuminated directional and instructional signage, and temporary security alarms for temporary exits and exit passageways.

3. Temporary measures shall suit and connect to existing building systems and shall be approved by CONSTRUCTION MANAGER and authorities having jurisdiction.

3.02.2 REMOVAL OF TEMPORARY BARRIERS AND ENCLOSURES

A. Removal of Temporary Barriers and Enclosures: Unless otherwise mutually agreed by CONSTRUCTION MANAGER and CONTRACTOR, remove temporary materials, equipment, services, and construction prior to Contract Completion review.

3.03 ENVIRONMENTAL CONTROLS

A. Dust Control

1. Provide positive control methods and apply dust control materials to minimize raising dust from demolition, excavation, or backfilling operations; and to prevent airborne dust from dispersing into the atmosphere.

2. When using water for additional dust control the CONTRACTOR shall record:

a. Date; and

b. Area(s) at the facility where water is applied.

c. Observe and enforce vehicle speed limit of 15 mph or less on the Site to minimize fugitive dust generated from vehicle traffic.

B. Water and Erosion Control

1. Provide methods to control surface water from the Site to prevent damage to adjoining properties in accordance with the Project SWPPP and the Drawings. CONTRACTOR shall meet the stricter of the requirements specified herein, indicated on the Drawings, or stated in the Project SWPPP.

2. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.

a. Hold the areas of bare soil exposed at one time to a minimum.

b. Provide temporary control measures such as berms, dikes, and drains.

3 Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff.

4 Provide, operate, and maintain hydraulic equipment of adequate capacity to control surface and groundwater.

5 Treat and dispose of surface runoff water in a manner to prevent flooding, erosion, sedimentation, or other damage to any portion of the Site or to adjoining areas, and in accordance with the storm water permit obtained for the demolition and remediation Activities.

C. Debris Control and Clean-Up

1. Keep the Site free at all times from accumulations of debris, waste materials, and rubbish caused by construction operations and employees. Responsibilities shall include:

   a. Adequate trash receptacles about the Site, emptied promptly when filled.

   b. Periodic cleanup to avoid hazards or interference with operations at the Site and to maintain the Site in a reasonably neat condition.

   c. The keeping of construction materials such as forms and scaffolding neatly stacked.

   d. Immediate cleanup to protect the Work by removing splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from walls, floors, and metal surfaces before surfaces are marred.

2. Prohibit overloading of trucks to prevent Spills on access and haul routes. Provide periodic inspection of traffic areas to enforce requirements.

3. Final cleanup is specified in SECTION 01 77 00 - Contract Closeout.

4. Pollution Control

   a. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of hazardous materials or Toxic Substance Control Act (TSCA) Materials from Site operations.

   b. Provide equipment and personnel, perform emergency measures required to contain any Spills, and remove contaminated soils or liquids. Contain all soils on Site and return to areas of excavations to be used as fill on Site. Only when approved by the CONSTRUCTION MANAGER, excavate, and dispose of any contaminated earth off-Site in approved locations, and replace with suitable compacted fill.

   c. CONTRACTOR shall provide analytical results of proposed fill materials prior to importing it to the site indicating the material does not contain constituents above all applicable standards.

   d. Take special measures to prevent harmful substances from entering public waters, sanitary, or storm sewers and ditches.

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surveying requirements for the Work.

1.02 RELATED SECTIONS

A. Section 31 2200: Grading
B. Section 32 1216: Asphalt Paving
C. Section 33 4400: Storm Drainage Utilities

1.03 SURVEY SERVICE

A. Unless otherwise stated by the ARCHITECT or noted in the Special Provisions, the CONTRACTOR shall provide all surveying services.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 SUBMITTALS

A. CONTRACTOR shall submit the name and address of the State of California licensed surveyor to CONSTRUCTION MANAGEMENT REPRESENTATIVE (CMR), ARCHITECT, and OWNER including any changes as they may occur.

B. CONTRACTOR shall submit to OWNER copies of cut sheets, coordinate plots, data collector printouts, and other documentation as available to verify completeness and/or accuracy of field surveying work.

C. Statement of Compliance: CONTRACTOR shall submit a statement of certification signed and sealed by Surveyor, counter-signed by CONTRACTOR indicating compliance with grade elevations, slopes, and tolerances.

3.02 LAYOUT OF THE WORK

A. CONTRACTOR shall employ a State of California licensed surveyor to lay out the entire Work, set grades, lines, levels, control points, vertical and horizontal control, elevations, grids, and positions. Before the commencement of Work, surveyor shall, in conjunction with OWNER and CONSTRUCTION MANAGEMENT REPRESENTATIVE (CMR) provided engineering survey of the Project site, locate all reference points and benchmarks, then lay out all lines, elevations, and measurements for the entire Work including but not limited to, buildings, grading, paving, and utilities.

B. All work under this contract shall be built in accordance with the lines and grades shown on the plans. Field survey for establishing these, and for the control of construction, shall be the responsibility of the CONTRACTOR. All such survey work including construction staking shall be done under the supervision of a California Licensed Land Surveyor or authorized Civil Engineer. Staking shall be done on all items ordinarily requiring grade and alignment, at intervals normally accepted by the agencies and trade involved.

C. The CONTRACTOR shall be responsible for any errors in the finished work, and shall notify the Engineer, in writing, within 24 hours of any discrepancies, or design errors during the construction staking.

D. CONTRACTOR shall immediately remediate any areas found not to meet specification requirements.

3.03 PERMANENT SURVEY MARKERS

A. Prior to the start of construction, the CONTRACTOR'S licensed Land Surveyor or qualified Civil Engineer shall, in conformance with Section 8771 of the California State Business and Professions Code, locate all monuments (both of record and not of record), benchmarks, and centerline ties within the construction zone, i.e., within one hundred feet of the construction activity.

B. After construction and prior to final acceptance by the Owner of the construction project, the CONTRACTOR'S land surveyor or qualified Civil Engineer shall re-survey all field monuments and centerline ties within the construction zone.

C. All survey monuments removed or altered as a result of construction shall be reset, Corner Records filed with the County Surveyor's Office, and approved final Corner Records filed with the City Engineer. Centerline ties removed as a result of construction shall be reset and tie sheets filed with the City Engineer.

D. The Land Surveyor shall provide a letter of certification for all monuments having four or more existing ties which are within 0.02 ft plus or minus of the original City tie sheet records. When several monuments and ties appear on one tie sheet and one of the ties has changed the Land Surveyor shall re-measure all of the ties and re-file a new tie sheet with the City as required herein.

E. County permanent and temporary benchmarks within the construction zone shall be located by the surveyor, and the CONTRACTOR'S Land Surveyor shall send a written notification of impending construction to the County Surveyor's Office two (2) weeks prior to construction.

3.04 SURVEY REQUIREMENTS

A. Establish a minimum of two (2) permanent horizontal and vertical control points on the Project site, remote from the work area, referenced to data established by the survey control points.

B. Indicate the reference points on the project record drawings with the basis of elevation being the established benchmarks.

C. Establish lines, grades, locations, and dimensions by instrumentation. From time to time, verify the layout of all Work by the same methods.

D. Provide grade stakes and elevations to construct over excavation and re-compaction, rough and final grades, paved areas, curbs, gutters, sidewalks, building pads, landscaped areas, and other areas as required.

E. Calculate and layout proposed finished elevations and intermediate control as required to provide smooth transitions between the spot elevations indicated in the Contract Documents.

F. Provide stakes and elevations for grading, fill, and topsoil placement.

G. Provide adequate horizontal and vertical control to locate utility lines, including but not limited to, storm, sewers, water mains, gas, electric and signal and provide vertical control in proportion to the slope of the line as required for accurate construction. Dry utilities will be based upon adequate horizontal and vertical control layout. Prior to trench closure, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished concrete or AC surfaces at key locations such as BC's, EC's, grade breaks, corners, or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.

H. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.

I. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within the building pad perimeter adequate to control both over excavation and re-compaction and the final sub-grade elevation of the building pad.

J. Submit a certification, signed by the surveyor, confirming the elevations and locations of improvements are in conformance with the Contract Documents. The statement shall include survey notes for the finish floor and building pad, showing the actual measured elevations on the completed sub-grade, recorded to the nearest 0.01'. Building pad tolerance will be +- 0.10'.

3.05 ESTABLISHMENT OF GRADES IN PLAY FIELD AREAS

A. Provide Grading Plan and Final survey: Prior to turf installation, a grade verification survey shall be performed. Final grade verification shall consist of site survey conducted by the Owner's surveyor consisting of a 30 ft. x 30 ft. grid. Additional planarity verification shall consist of string line and 10 ft strait edge checks at random over entire area which has been prepared for synthetic turf. CONTRACTOR shall immediately remediate any areas found not to meet specification.

B. The permeable base contours of the field, after final compaction and grading, shall not have deviations in surface shape greater than 3/16" over a 10' span. Final contour shall be plotted on a table of laser-sighted grade elevations using a rectangular grid size of 120 yards by 60 yards with measurements every 20 yards (28 total elevation points). Grade elevations to be reviewed and approved prior to installation of the soil isolation fabric. Fine grade to the required tolerances leaving behind no tire tracks or indentations.

C. CONTRACTOR shall not proceed with work without ARCHITECT'S approval.

3.06 ESTABLISHMENT OF GRADES IN HARDSCAPE AREAS

A. All work shall conform to the lines, elevations, and grades shown on the Grading Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the CONTRACTOR shall be responsible for any error in the grade of the finished work.

B. Areas having drainage gradients of 2 percent or more shall have elevation stakes, set with instrument, at grid intervals of 25 feet. Intermediate stakes may be set by using a tightly drawn string line over the tops of adjacent stakes. Grade stakes must be set at all grade breaks, grade changes, etc.

C. Areas having drainage gradients of less than 2 percent shall have elevation stakes, set with instrument, at 10-foot intervals. Grade stakes must be set at all grade breaks, grade changes, etc.

D. Protect and maintain stakes in place until their removal is approved by the Owner. Grade or location stakes lost or disturbed by CONTRACTOR, shall be reset by the Surveyor at the expense of CONTRACTOR.

3.07 STORM DRAIN PIPE INSTALLATION

A. All storm drain pipelines, catch basins, and drain inlets shall be staked by a licensed surveyor if slope of grade is less than 2% and a complete set of cut sheets shall be supplied to the Inspector. All construction staking shall be installed and verified for grade and alignment prior to the start of construction.

3.08 RECORD DRAWINGS

A. Upon Substantial Completion, CONTRACTOR shall obtain and pay for reproducible transparencies (or electronic files) of the as built survey drawings. Deliver to ARCHITECT, final “record” drawings of the original drawings and completed Work within specified tolerances.

B. Record drawings shall indicate locations by coordinate of all utilities onsite with top of pipe elevations at major grade and alignment changes, rim grate or top-of-curb and flow line elevations of all drainage structures and manholes.

C. Completed record drawing transparencies (or electronic files) shall be signed and certified as correct and within specified tolerances by the licensed surveyor.

D. Attention is called to other sections of the Contract Documents requiring verification or measurements of installed Work by survey. Surveyor shall perform and certify all such surveys or verification are completed in accordance with the Contract Documents.

END OF SECTION

SECTION 01 74 00

CLEANING REQUIREMENTS

PART 1 - GENERAL

A. RELATED REQUIREMENTS

1. Section 01 74 10 - Final Cleaning Requirements.

2. Section 01 50 00 - Construction Facilities and Temporary Controls.

3. Section 01 77 00 - Contract Closeout.

4. Special cleaning requirements for specific construction elements are included in appropriate Sections of Contract Documents.

B. REFERENCES (Not Used).

C. PROJECT CLEANLINESS

1. Maintain Work in tidy condition, free from accumulation of waste products and debris, that caused by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT or other CONTRACTORS.

2. Keep construction site, adjacent properties, access roads, and haul routes free from accumulation of waste materials, rubbish, and windblown debris.

3. Remove waste materials from site at daily regularly scheduled times or dispose of as directed by CONSTRUCTION MANAGER. Do not burn waste materials on site, unless approved by CONSTRUCTION MANAGER.

4. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

5. Dispose of waste materials and debris off site.

6. Clean interior areas prior to start of finishing work and maintain areas free of dust and other contaminants during finishing operations.

7. Store volatile waste in covered metal containers and remove from premises at end of each working day.

8. Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

9. Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

10. Schedule cleaning operations so that resulting dust, debris, and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

D. CLEANING and DEBRIS REMOVAL

1. Remove on a continuing basis rubbish and debris resulting from Work. Maintain Existing Improvements and Site in a clean and orderly condition at all times until Acceptance of Work by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and/or CONSTRUCTION MANAGER.

2. Street Cleaning. CONTRACTOR shall be responsible for removing from the city streets excavated materials and debris resulting from the Work.

3. Dust and Dirt Control. CONTRACTOR shall contain dust and remove it from Site at intervals sufficient to prevent contamination outside Work limits. CONTRACTOR shall use adequate watering techniques to alleviate accumulation of construction-generated dust.

4. CONTRACTOR shall be responsible for containment of dust emission from all construction, transport, storage, or handling activities, in accordance with South Coast Air Quality Management District (SCAQMD) Rule 403: Fugitive Dust.

5. CONTRACTOR shall be responsible for cleanup of all construction-related dirt on approach routes to Site.

6. CONTRACTOR will be held accountable for all damage to drain system, including any routing or replacement thereof.

7. At completion, all excavations shall be backfilled, and all remaining surfaces shall be cleaned, and marks and stains removed, leaving the site ready for inspection.

E. DEBRIS CLEAN-UP

1. All debris must be controlled by the CONTRACTOR. The CONTRACTOR shall remove on a continuing basis debris, spoils, rubbish, and debris resulting from Work and maintain the Site in a clean and orderly condition at all times. If Site allows, the CONTRACTOR shall containerize spoils in a designated area, as directed by the HACIENDA LA PUENTE UNIFIED DISTRICT'S CONSTRUCTION MANAGER. If Site does not allow, CONTRACTOR will retain street permit and container.

2. CONTRACTOR will be held accountable for all damage to drain system, including any routing or replacement thereof.

3. CONTRACTOR to submit Construction Debris Clean-up Plan to HACIENDA LA PUENTE UNIFIED DISTRICT'S CONSTRUCTION MANAGER for review and approval.

4. The CONTRACTOR shall dispose of debris legally at licensed disposal facilities.

5. Upon completion of the work and immediately prior to the final punch list inspection, the CONTRACTOR shall clean the entire demolition area.

6. The CONTRACTOR shall restore or replace fences, gates, vegetation, wetlands, trees, ground surfaces, and disturbed areas to original condition or as directed by the CONSTRUCTION MANAGER.

7. The CONTRACTOR shall restore the access roads to pre-project conditions where staging and access are indicated on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 74 16

STORM WATER POLLUTION PREVENTION PLAN

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Storm water permitting and certification in compliance with state and local regulations, including payment of annual fees, final fee, and electronic filing, through SMARTS website.

2. Preparation, implementation, upkeep, and monitoring of Storm Water Pollution Prevention Plan (SWPPP).

3. Control runoff and pollutants from the site during construction activities.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 41 10 - Regulatory Requirements
3. Section 01 50 00 - Construction Facilities and Temporary Controls
4. Section 01 74 16A - Storm Water Management Monthly Report
5. Sector 01 77 00 - Contract Closeout Procedure

1.02 ACRONYMS AND DEFINITIONS

BMP	Best Management Practice.
CAN	Corrective Action Notice.
CASQA	California Stormwater Quality Association.
COI	Change of Information.
DWQ	Division of Water Quality.
CGP	NPDES General Permit for Storm Water Discharges Associated with Construction Activities.
ELAP	Environmental Laboratory Accreditation Program.
MWQCB	Montebello Regional Water Quality Control Board.
LRP	Legally Responsible Person (HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT).
NOI	Notice of Intent.
NOT	Notice of Termination.
NPDES	National Pollutant Discharge Elimination System.
PRDs	Permit Registration Documents, including NOI, Risk Assessment, Site Map, SWPPP, Annual Fee, Signed Certification Statements.

REAP Rain Event Action Plan.

RISK LEVEL As defined by CGP.

QSD Qualified SWPPP Developer.

QSP Qualified SWPPP Practitioner.

QRE Qualifying Rain Event, is an event that produces 0.5 inches of precipitation with a 48 hour or more period between rain events.

SMARTS Storm Water Multiple Application and Report Tracking System (smarts.waterBoard.ca.gov).

SWPPP Storm Water Pollution Prevention Plan.

SWRCB State Water Resources Control Board.

WPCD Water Pollution Control Drawings.

WDID Waste Discharge Identification Number.

1.03 SWPPP REQUIREMENTS

A. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT (HLPUSD) has contracted with others for the development of a SWPPP by a California Certified Qualified SWPPP Developer (QSD). The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will provide the SWPPP to the CONTRACTOR at NTP.

B. Prior to start of Demolition, CONTRACTOR shall:

1. CONTRACTOR shall be responsible for hiring or contracting for the services of a California certified Qualified SWPPP Practitioner (QSP).

2. Develop new SWPPP or update SWPPP provided by ARCHITECT to reflect CONTRACTOR'S proposed staging, phasing, schedule, and other work activities. SWPPP shall be certified by QSD.

3. Incorporate SWPPP activities into the Project Schedule.

4. Complete the following on the SMARTS website under project application started by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT LRP. CONTRACTOR shall provide QSP and Site Superintendent information to CONSTRUCTION MANAGER/LRP in order to be linked to the application.

a. The HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will be responsible for submitting the approved SWPPP and all associated permit fees to the State Water Resources Control Board.

b. CONTRACTOR'S QSP shall be responsible for providing and implementing all measures of the Approved SWPPP, including continuous maintenance throughout the life of the project, especially before, during, and after rain events.

c. CONTRACTOR shall be responsible for all water samples testing required by the SWPPP.

d. CONTRACTOR shall modify and amend the SWPPP as necessary based on project conditions, durations, weather, and seasonal changes. The minimum compliance basis shall be that of the California General Permit (NPDES) 2009-009-DWQ as modified by 2010-0014-DWQ

e. Risk Level Calculation.

1. Inform CONSTRUCTION MANAGER/LRP to review and certify the NOI application and PRDs on SMARTS at least ten (10) days prior to soils disturbance.

2. CONTRACTOR shall have storm drain pollution prevention measures in place and functioning at all times. The Construction General Permit (CGP) does NOT recognize a rainy season.

3. Secure and pay for deposits, and inspection fees to local jurisdiction, if required.

4. Inform CONTRACTOR and SUBCONTRACTORS personnel on the BMP procedures to prevent pollutants from entering the storm drain system before they start construction activities.

5. CONTRACTOR shall not allow any non-storm water discharges, including ground water, to enter the storm drain system. Examples of non-storm water discharges include but are not limited to domestic supply water used to wash streets, construction materials, tools, equipment, and vehicles.

6. Discharges not covered by the Construction General Permit shall be discharged as required per appropriate city, county, or state standard.

C. During Construction:

1. Implement, install, and maintain BMPs. Ensure that BMPs are designed to protect all exposed portions of the site.

2. Retain copy of the SWPPP, monitoring records, and PRD on site until Completion.

3. Conduct and document storm water pollution prevention training of CONTRACTOR site personnel and provide records of training to CONSTRUCTION MANAGER. See Attachment “D” for sample training log. Keep personnel informed of the SWPPP changes.

4. Monitor the Project Site per the CGP requirements.

   a. Conduct site inspection of pollution prevention controls and provide Site Monitoring Reports per the CGP and SWPPP. Prepare and maintain, at the Project site, a log of each inspection using Site Monitoring Report forms (Attachment “A”, at the end of this Section. Inspections shall include, at a minimum:

      1) At least weekly.

      2) Within 48 hours prior to a QRE.

      3) Within 48 hours after a QRE, conduct a post-storm event inspection to identify weather BMPs are adequately designed, implemented, and effective and identify any additional BMPs necessary and revise the SWPPP accordingly.

      4) At least once each 24 hours during extended storm events.

      5) Conduct quarterly non-storm water inspections (Attachment “C”).

   b. Conduct sampling and reporting as directed by CGP and outlined in the SWPPP Construction Site Monitoring Plan.

   c. For Risk Level 2 and 3 sites only, prepare a REAP a minimum of 48 hours prior to a likely precipitation event with over a 50% or greater chance of producing precipitation on the project area.

d. Precipitation forecast information shall be obtained from the National Weather Service Forecast Office (http://www.srh.noaa.gov/).

5. Participate in quarterly SWPPP inspections with representative from CONSTRUCTION MANAGER team.

6. Non-compliance with the CGP and Unauthorized Discharges shall be reported to CONSTRUCTION MANAGER immediately.

7. Provide verification annually that construction activities are in compliance with SWPPP. Submit Annual Report Compliance Certification (Attachment "B") to CONSTRUCTION MANAGER and complete Annual Report on SMARTS by July 15th of each year, for review and certification. Annual Report will be certified by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S LRP.

8. Maintain, Report, and update SWPPP and PRDs on the SMARTS website, including items listed below.

   a. Upload SWPPP amendments.

   b. Complete Ad-Hoc Reports for all sampling events. Non-Visible, Effluent Monitoring, and Exceedance Results must be reported electronically by deadlines per CGP.

   c. Provide COI in SMARTS to reflect changes to construction site area, schedule, and risk level. COI shall be submitted to CONSTRUCTION MANAGER/LRP for certification.

9. Pay annual fees related to the CGP up until the date of Completion.

10. Pay fines and penalties from regulatory agencies against HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT due to CONTRACTOR'S non-compliance with storm water regulations. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT shall recover costs of fines and penalties by appropriate HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT assessment. Review of the SWPPP and inspection log by CONSTRUCTION MANAGER shall not relieve CONTRACTOR from liabilities arising from non-compliance of storm water pollution regulations.

11. Update Post Demolition BMP Installation and Maintenance Log and complete Maintenance Plan, provided by ARCHITECT, to reflect 'actual products installed. Markup Site Plan, to reflect 'As-Builts' conditions.

D. At Completion:

1. Provide SWPPP, Site Monitoring Reports, and record documents to CONSTRUCTION MANAGER.

2. Handover the maintenance log and maintenance plan to CONSTRUCTION MANAGER. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT will maintain prevention controls left in place.

3. Conduct Post-Construction BMP training of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT personnel.

4. Notify CONSTRUCTION MANAGER to schedule a meeting to confirm Completion of SWPPP.

5. Submit to CONSTRUCTION MANAGER Completion Certification that the Project has met all of the conditions of the CGP (Attachment "B"). Post-construction storm water operation and management plan as mentioned in the compliance certifications shall be in place at Completion.

6. Prepare the final Annual Report and NOT to terminate permit coverage. Submit NOT electronically with required attachments through the SMARTS system. NOT will be certified by the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S LRP.

7. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Maintenance and Operations will maintain prevention controls left in place after CONTRACTOR receives Completion.

E. Project INSPECTOR and CONSTRUCTION MANAGER will conduct inspection and examination of the SWPPP.

1.04 SUBMITTALS

A. Submit the following:

1. Qualifications and experience of QSP for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S review and acceptance.

2. Two (2) electronic copies (CDs) of SWPPP updated and certified by QSD.

3. Documentation in accordance with CGP requirements for SWPPP, including:

a. BMP material quality, grade, type as specified in the CASQA BMP Handbook.

b. Electronic Copies of weekly and quarterly inspections, annual reports, compliance certifications, and test results.

c. Proof of filing with the Water Board; copies of PRDs and all attachments.

d. Training records of CONTRACTOR site personnel.

e. BMP implementation schedule.

f. WPCD revisions.

B. SWPPP Closeout Documents: At Completion provide one (1) hard copy with electronic files of the documents listed below to CONSTRUCTION MANAGER. CONSTRUCTION MANAGER will forward records electronically to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT Supervising Civil Engineer for retention period of three (3) years.

1. Copy of SWPPP and PRDs, including NOI, Monitoring Program, Inspection Records, Annual Reports, Compliance Certifications, and supporting documents.

2. Updated and signed SWPPP amendments and amendment log.

3. Storm and non-storm water sampling records and test results, including Noncompliance Reports, when limits are exceeded.

4. Training Records for CONTRACTOR and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT personnel.

5. Maintenance records for post construction BMP.

6. Updated Post-Construction Storm Water Management Plan to reflect 'As-Builts' conditions.

7. Notice of Termination.

8. Signed Completion Certification that the Project has met all of the conditions of the CGP.

1.05 QUALITY ASSURANCE

A. Comply with the following regulatory requirements:

1. National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Lands Disturbance Activities; ORDER NO. 2009-0009-DWQ; NPDES NO. CAS000002, adopted by the State Water Resources Control Board.

2. Regulations of the California Environmental Protection Agency, State Water Resources Control Board; Los Angeles Regional Water Control Board, and local ordinances.

3. CASQA Stormwater Best Management Practice Handbook for Construction Activity (BMP Handbook), current adopted edition.

4. Local jurisdiction stormwater management (SWPPP) and erosion control ordinances.

B. Qualifications: CONTRACTOR'S QSP shall meet the following qualifications:

1. Current certification as a CASQA Qualified SWPPP Practitioner.

2. Two (2) years minimum experience in erosion and sediment control and knowledgeable in the requirements of SWPPP, Best Management Practices and GCP.

1.06 STORAGE AND PROTECTION

A. Provide proper storage of materials and equipment to prevent rain and storm water runoff to come in contact with pollutants, such as soil stabilizers, paint, or fluids from vehicles.

1.07 TRAINING OF HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT PERSONNEL

A. Training of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S personnel shall include eight (8) hours of on-site overview and maintenance of the following Post Construction BMPs:

1. Proprietary Biotreatment Devices.

2. Sand Filters and Cartridge Media Filters.

3. Infiltration Trenches, Dry Wells, Proprietary Infiltration Devices, and Permeable Pavement.

4. Hydrodynamic Devices and Catch Basin Inserts.

B. Training of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S personnel on the Post Construction BMPs shall be per Section 01 79 00 and Division 2 - Site Construction.

1.08 ATTACHMENTS

A. The following attachments are included at the end of this Section:

1. Attachment "A" - Storm Water Pollution Prevention Site Monitoring Report.
2. Attachment "B" - Compliance Certification and Checklist.
3. Attachment "C" - Quarterly Non-Storm Water Form.
4. Attachment "D" - Sample HLPUSD Construction Storm Water Training Form.

B. The following documents are to be provided by the ARCHITECT:

1. Document “A” - Post-Demolition Storm Water Management Plan.
2. Document “B” - Post-Demolition Water Balance Calculator.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide quality, grade and type of materials as specified in the CASQA BMP Handbook.

B. Provide and have available on-site during construction activities a non-stormwater sampling kit suitable for obtaining storm water and non-stormwater quality grab samples. Kit shall include containers and preservatives appropriate for the pollutants known or expected to be in the stormwater. Required sampling equipment shall be adequate to capture and transport samples to a local ELAP State certified water testing lab.

C. Provide a rain gauge on site to record readings during site inspections.

PART 3 - EXECUTION

3.01 IMPLEMENTATION

A. Install perimeter controls prior to starting work at the Project site.

B. Implement BMPs as specified in the SWPPP to contain on-site storm water on the Project site. Provide storm drain inlet protection. Do not drain on-site water directly into the storm drain without proper BMPs in place. If an Active Treatment System (ATS) is used, comply with the design storm specified in the CGP (10-year, 24-hour event)

C. Prevent pollutant discharges into the storm drain system. Prevent storm water from coming into contact with pollutants, such as material spills, or leakage from storage tanks, waste containers, or transfer areas. In the event contamination is found CONTRACTOR shall immediately notify CONSTRUCTION MANAGER.

D. Protect exposed dirt, such as stockpiles, landscaping areas, and hillsides.

E. Properly manage non-storm water discharges such as ground water, broken utility lines and fire hydrant testing per CGP requirements.

F. Adjust BMP’s locations and layouts in accordance with construction progress to assure compliance to regulations.

G. Conduct inspections of pollution prevention controls and provide Site Monitoring Report to CONSTRUCTION MANAGER immediately if pollutants are discharged into the site runoffs. CONTRACTOR shall sample and remediate contaminated water.

H. Upon Completion: Maintain and leave post-construction storm water pollution prevention controls in place and remove those that are not needed as determined by the QSD and CONSTRUCTION MANAGER.

3.02 SWPPP CLOSEOUT

A. Verify the following prior to Completion of SWPPP:

1. Elements of the SWPPP have been completed.

2. Final stabilization of site, as defined by the GCP, has been demonstrated.

3. There is no potential for construction related storm water pollutants to be discharged into site runoff.

4. Construction related equipment and temporary BMPs have been removed from site.

5. Rubbish, debris, and waste materials have been removed and legally disposed of off the Project site.

6. CONSTRUCTION MANAGER CAN items have been closed and signed-off.

7. Post-Construction BMP Maintenance Plan has been established.

END OF SECTION

2023-24.06R1 HLPUSD Project Number	**HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT As HLPUSD** **ATTACHMENT "A"** **STORM WATER POLLUTION PREVENTION SITE MONITORING REPORT**	STATE OF CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

Project Name: **Temple Academy Performing Arts Center**

Project Description:

Contract Number

I. Type of Examination: (Use one form for each type of examination):

☐ Prior to Anticipated Storm Event ☐ After Actual Storm Event ☐ Weekly

Date Examined: _____

II. Check the response for each SWPPP question below:

		YES	NO
1.	Do you have an updated Storm Water Pollution Prevention Plan (SWPPP) and a BMP Handbook on the Project site?	☐	☐
2.	Does your SWPPP incorporate an up-to-date erosion control plan?	☐	☐
3.	Is the erosion control installed per plan?	☐	☐
4.	If the Work is at a stage where the erosion control plan cannot be constructed, is the erosion control at the Maximum Extent Practicable for the stage you are in?	☐	☐
5.	Did you observe the presence of any floating materials such as oil, grease, pieces of wood, paper, etc., odor, toxics, and/ or sediments?	☐	☐
6.	If yes, what is it that you observed?		
7.	Have the SWPPP revisions been certified by the QSD and uploaded to SMARTS?	☐	☐

III. Check the status of the following items as observed:

	SWPPP Items	Not Applicable Acceptable		Not Acceptable		Repairs Required	Date Repairs Completed
1.	De-silting Basins (Cleaned)	☐	☐	☐	--	☐	
2.	Water Quality Basin	☐	☐	☐	--	☐	
3.	Silt Fences	☐	☐	☐	--	☐	
4.	Hay bales/ Check dams/ Sandbags	☐	☐	☐	--	☐	
5.	Berms and Dikes	☐	☐	☐	--	☐	
6.	Sand/Gravel Inlet	☐	☐	☐	--	☐	
7.	Slope Protection - Polymer and Mulch	☐	☐	☐	--	☐	
8.	Vegetation / Re-vegetation	☐	☐	☐	--	☐	
9.	Dust Control	☐	☐	☐	--	☐	
10.	Surface Erosion	☐	☐	☐	--	☐	
11.	Slope Instability	☐	☐	☐	--	☐	
12.	Storage	☐	☐	☐	--	☐	
13.	Disposal	☐	☐	☐	--	☐	
14.	Spills	☐	☐	☐	--	☐	
15.	Clean-up	☐	☐	☐	--	☐	
16.		☐	☐	☐	--	☐	
17.		☐	☐	☐	--	☐	

IV. Describe any problems or required repairs checked above and the necessary actions needed:

Item	Description of Problem or Required Repair	Action Needed

Examination Performed by CONTRACTOR:

By (Print Name and Title) Date

Verified by Inspector:

By (Print Name and Title) Date

Detailed Storm Water Quality Construction Site Inspection Checklist

ATTACHMENT "A" (Cont.)

GENERAL INFORMATION				
Project Name	**Temple Academy Performing Arts Center**			
Project Number	HLPUSD Ref. No. 2023-24.06R1			
CONTRACTOR				
Inspector's Name				
Inspector's Title				
Signature				
Date of Inspection				
Inspection Type (Check Applicable)	❑ Prior to forecast rain ❑ 24-hr intervals during extended rain		❑ After a rain event ❑ Other (Weekly or Quarterly)	
Season (Check Applicable)	❑ Rainy		❑ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs.):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (inches)	

PROJECT AREA SUMMARY AND DISTURBED SOIL AREA (DSA) SIZE		
Total Project Area	_____	Acres
Field Estimate of Active DSAs	_____	Acres
Field Estimate of Non-Active DSAs	_____	Acres

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Preservation of Existing Vegetation				
Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned?				
Location:				
Location:				
Location:				
Location:				
Erosion Control				
Does the applied temporary erosion control provide 100% coverage for the affected areas?				
Are any non-vegetated areas that may require temporary erosion control?				
Is the area where erosion controls are used required free from visible erosion?				
Location:				
Location:				
Location:				
Location:				
Temporary Linear Sediment Barriers (Silt Fence, Fiber Rolls, Sandbag Barriers, etc.)				
Are temporary linear sediment barriers properly installed, functional and maintained?				
Are temporary linear sediment barriers free of accumulated litter?				
Is the builtup- sediment less than 1/3 the height of the barrier?				
Are cross barriers installed where necessary and properly spaced?				
Location:				
Location:				
Location:				
Location:				
Location:				
Storm Drain Inlet Protection				
Are storm drain inlets internal to the project properly protected?				
Are storm drain inlet protection devices in working order and being properly maintained?				
Location:				
Location:				
Location:				
Location:				
Location:				
Sediment Basins				

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Are basins designed in accordance with the requirements of the General Permit?				
Are basins maintained to provide the required retention/detention?				
Are basin controls (inlets, outlets, diversions, weirs, spillways, and racks) in working order?				
Location:				
Location:				
Location:				
Location:				
Stockpiles				
Are all locations of temporary stockpiles, including soil, hazardous waste, and construction materials in approved areas?				
Are stockpiles protected from run on-, run-off from adjacent areas and from winds?				
Are stockpiles located at least 15 m from concentrated flows, downstream drainage courses and storm drain inlets?				
Are required covers and/or perimeter controls in place?				
Location:				
Location:				
Location:				
Location:				
Concentrated Flows				
Are concentrated flow paths protected and free from visible erosion?				
Location:				
Location:				
Location:				
Location:				
Tracking Control				
Is the entrance stabilized to prevent tracking				
Is the stabilized entrance inspected daily to ensure that it is working properly				
Are points of ingress/egress to public/private roads inspected and swept and vacuumed as needed?				
Are all paved areas free of visible sediment tracking or other particulate matter?				
Location:				
Location:				
Location:				
Location:				
Wind Erosion Control				
Is dust control implemented?				

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Location:				
Location:				
Location:				
Location:				
Dewatering Operations				
Are all one-time dewatering operations covered by the General Permit inspected before and as they occur and BMPs implemented as necessary during discharge?				
Is ground water dewatering handled in conformance with the dewatering permit issued by the AHJ?				
Is required treatment provided for dewatering effluent?				
Location:				
Location:				
Location:				
Location:				
Vehicle & Equipment Fueling, Cleaning, and Maintenance				
Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material?				
Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas?				
If no, are drip pans used?				
Are dedicated fueling, cleaning, and maintenance areas located at least 15 m away from downstream drainage facilities and watercourses and protected from run on- and runoff?				
Is wash water contained for infiltration/ evaporation and disposed of appropriately?				
Is on-site cleaning limited to washing with water (no soap, soaps substitutes, solvents, or steam)?				
On each day of use, are vehicles and equipment inspected for leaks and if necessary, repaired?				
Location:				
Location:				
Location:				
Location:				
Waste Management & Materials Pollution Control				
Are material storage areas and washout areas protected from run on- and runoff, and located at least 15 m from concentrated flows and downstream drainage facilities?				
Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate clean-up supplies?				
Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities?				
Are bagged and boxed materials stored on pallets?				

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Are hazardous materials and wastes stored in appropriate, labeled containers?				
Are proper storage, clean-up, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous, and accessible locations adjacent to storage areas?				
Are temporary containment facilities free of spills and rainwater?				
Are temporary containment facilities and bagged/boxed materials covered?				
Are temporary concrete washout facilities designated and being used?				
Are temporary concrete washout facilities functional for receiving and containing concrete waste and are concrete residues prevented from entering the drainage system?				
Do temporary concrete washout facilities provide sufficient volume and free Board for planned concrete operations?				
Are concrete wastes, including residues from cutting and grinding, contained, and disposed of off-site or in concrete washout facilities?				
Are spills from mobile equipment fueling and maintenance properly contained and cleaned up?				
Is the site free of litter?				
Are trash receptacles provided in the yard, field trailer areas, and at locations where workers congregate for lunch and break periods?				
Is litter from work areas collected and placed in watertight dumpsters?				
Are waste management receptacles free of leaks?				
Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds?				
Are waste management receptacles filled at or beyond capacity?				
Location:				
Location:				
Location:				
Location:				
Temporary Water Body Crossing or Encroachment				
Are temporary water body crossings and encroachments constructed appropriately?				
Does the project conform to the requirements of the 404 permit and/or 1601agreement?				
Location:				
Location:				
Location:				
Location:				
Illicit Connection/ Discharge				
Is there any evidence of illicit discharges or illegal dumping on the project site?				

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
If yes, has the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT/Operator been notified?				
Location:				
Location:				
Location:				
Location:				
Discharge Points				
Are discharge points and discharge flows free from visible pollutants?				
Are discharge points free of any significant sediment transport?				
Location:				
Location:				
Location:				
Location:				
SWPPP Update				
Does the SWPPP and Project Schedule adequately reflect the current site conditions and CONTRACTOR operations?				
Are all BMPs shown on the Erosion Control Plans installed in the proper location(s) and according to the details in the SWPPP?				
Location:				
Location:				
Location:				
Location:				
General				
Are there any other potential concerns at the site?				
Location:				
Location:				
Location:				
Location:				
Storm Water Monitoring				
Does storm water discharge directly to a water body listed in the General Permit as impaired for sediment/sedimentation or turbidity?				
If yes, were samples for sediment/sedimentation or turbidity collected pursuant to the sampling and analysis plan in the SWPPP?				
Did the sampling results indicate that the discharges are causing or contributing to further impairment?				
If yes, were the erosion/sediment control BMPs improved or maintained to reduce the discharge of sediment to the water body?				

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Were there any BMPs not properly implemented or breaches, malfunctions, leakages, or spills observed which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				
If sampling indicated pollution of the storm water, were the leaks, breaches, spills, etc. cleaned up and the contaminated soil properly disposed of?				
Were the BMPs maintained or replaced?				
Were soil amendments (e.g., gypsum, lime) used on the project?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan in the SWPPP?				
If sampling indicated pollution of the storm water by the use of the soil amendments, is there a contingency plan for retention onsite of the polluted storm water?				
Did storm water contact stored materials or waste and run off the construction site? (Materials not in watertight containers, etc.)				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan in the SWPPP?				

2023-24.06R1 HLPUSD Project Number	**HACIENDA LA PUENTE UNIFIED DISTRICT** **As HLPUSD** **ATTACHMENT "B"** **GENERAL CONSTRUCTION ACTIVITY STORM WATER PERMIT COMPLIANCE CERTIFICATION**	STATE OF CALIFORNIA STATE WATER BOARD WDID NO._____

Project Name:	**Temple Academy Performing Arts Center**	
Project Description:		Contract Number

ANNUAL CERTIFICATION

I certify the Project has met the following conditions: All elements of the Storm Water Pollution Prevention Plan are in place; construction materials and equipment maintenance waste have been disposed of properly; and the Project site is in compliance with all local storm water management requirements including erosion/sediment control requirements, and the appropriate use permits have been obtained. The reports have been uploaded to smarts.waterBoards.ca.gov system.

CONTRACTOR: _____

Print Name: _____ Title: _____

Signature: _____ Date: _____

COMPLETION CERTIFICATION

I certify the Project has been completed and the following conditions have been met: All elements of the Storm Water Pollution Prevention Plan have been completed; construction materials and equipment maintenance waste have been disposed of properly; the Project site is in compliance with all local storm water management requirements including erosion/sediment control requirements and the appropriate use permits have been obtained; and a post-construction storm water operation, and management plan is in place.

CONTRACTOR: _____

Print Name: _____ Title: _____

Signature: _____ Date: _____

ATTACHMENT "B" (CONT.)

CERTIFICATION CHECK LIST

SITE _____

PROJECT NUMBER _____

IS SWPPP BOOK ONSITE AND UPDATED	[ ] YES	[ ] NO
TRAINING RECORDS	[ ] YES	[ ] NO
CONSTRUCTION SCHEDULE	[ ] YES	[ ] NO
EROSION CONTROL PLAN	[ ] YES	[ ] NO
Property Line Dileanated	[ ] YES	[ ] NO
Active / Inactive Areas	[ ] YES	[ ] NO
Drainage Patterns	[ ] YES	[ ] NO
Discharge Points	[ ] YES	[ ] NO
Sampling Points	[ ] YES	[ ] NO
BMPs with legend	[ ] YES	[ ] NO
Staging Areas, Stockpiles, entrance exit	[ ] YES	[ ] NO
Vehicle Storage, concrete wahsout	[ ] YES	[ ] NO
SIGNED COPY OF NOI ON WALL	[ ] YES	[ ] NO
WEEKLY REPORTS FILED	[ ] YES	[ ] NO
WEATHER REPORTS	[ ] YES	[ ] NO
QUARTERLY NON-STORMWATER (Attachment "C")	[ ] YES	[ ] NO

LATEST DATED:_____

SWPPP AMENDMENTS DOCUMENTED [ ] YES [ ] NO

ANNUAL FEES PAID AND REPORTS FILED LATEST DATED:_____

Data Submitter _____
login _____
SMARTS access _____
OAR _____
login _____

DATE OF LAST ENVIRONMENTAL HEALTH & SAFETY INSPECTION VISIT LATEST DATED:_____

WERE ENVIRONMENTAL HEALTH & SAFETY RECOMMENDATION IMPLEMENTED [ ] YES [ ] NO

CERTIFICATION OF CONTRACTORS QSP

Name _____
Agency _____
Number _____
Expiration Date _____
Email _____
Phone

Sampling Kit Lab Name

COMMENTS

DCM NAME	CONTRACTOR NAME
SIGNATURE	SIGNATURE

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT
Facilities Services Division

Attachment "C"
Quarterly / Annual Non-Stormwater Form

I. WDID NO. _____

II. FACILITY OPERATOR INFORMATION

Facility Name			Contact Person	
Mailing Address			Title	
City	State	**CA**	Zip	Phone

III. FACILITY SITE INFORMATION

Facility Name			Contact Person	
Location			Title	
City	State	**CA**	Zip	Phone

IV. PERMIT LANGUAGE

All dischargers are required to conduct quarterly, non-storm water visual inspections. For these inspections, the discharger must visually observe each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

CGP Section II.E describes authorized non-storm water discharges including those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water dewatering, and other discharges not subject to a separate general NPDES permit adopted by a region. Additionally, authorized non-storm water discharges must not be used to clean up failed or inadequate construction or post-construction BMPs designed to keep materials onsite. Authorized non-storm water dewatering discharges may require a permit because some Regional Water Boards have adopted General Permits for dewatering discharges. The General Permit prohibits the discharge of storm water that causes or threatens to cause pollution, contamination, or nuisance.

Non-storm water discharges directly connected to receiving waters or the storm drain system have the potential to negatively impact water quality. The discharger must implement measures to control all non-storm water discharges during construction, and from dewatering activities associated with construction. Examples include properly washing vehicles in contained areas, cleaning streets, and minimizing irrigation runoff.

Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

V. DOCUMENT CHECKLIST (Please check each item to verify that the documents are attached)

☐ Did Authorized Discharge take place? ☐ Did Unauthorized Discharge take place?
☐ Form 2 Attached ☐ Form 3 Attached
☐ Complete Form 1 once a Quarter and prior to fire hydrant testing or other authorized discharges.

FORM 1

Structural Best Management Practices Housekeeping for Non-Visible Pollutants	**BMP Conditions E, NM, N/A YES OR NO**	**Actions Taken or BMPs Added**
Drainage Areas		
Free of Floating & Suspended Material		
Free of Sheen/Discoloration		
Free of Turbidity		
Free of Odor		
Construction Materials Storage Areas		
Materials Properly Stored		
Pollutants Covered		
Pollutants Bermed		
Construction Waste Management		
Containment Stockpiled Waste		
Containment Sanitary Facilities		
Containment Waste Watertight Containers		
Vehicle Storage/Fueling/Spill Prevention		
Fueling Procedures/Designated Areas		
Vehicle Storage with Containment		
Spill Kit Onsite		
Concrete Residuals & Washouts Wastes		
Properly Placed Washout		
Secondary Containment		
Landscape Materials		
Stored Away from Flow Lines		
Containment Fertilizers/Soil Amendments		
Secondary Containment Plants		
Observations/Comments:		
E-EFFECTIVE N/M-NEEDS MAINTENANCE N/A-NOT APPLICABLE YES or NO		

REPORT – PART A FORM 2 QUARTERLY VISUAL OBSERVATIONS OF <u>AUTHORIZED</u> NON-STORM WATER DISCHARGES (NSWDs)

- Quarterly dry weather visual observations are required of each authorized NSWD.
- Observe each authorized NSWD source, impacted drainage area, and discharge location.
- Authorized NSWDs must meet the conditions provided in Section D (pages 5-6), of the General Permit.
- Make additional copies of this form, as necessary.

QUARTER: **JULY-SEPT.** DATE:	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?** **YES** ☐ If **YES**, complete Part B of this form. **NO** ☐
QUARTER: **OCT.-DEC.** DATE:	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?** **YES** ☐ If **YES**, complete Part B of this form. **NO** ☐
QUARTER: **JAN.-MARCH** DATE:	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?** **YES**. ☐ If **YES**, complete Part B of this form. **NO** ☐
QUARTER: **APRIL-JUNE** DATE:	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER? NO** **YES** ☐ If **YES**, complete Part B of this form. **NO** ☐

REPORT
FORM 2 – QUARTERLY VISUAL OBSERVATIONS OR AUTHORIZED NON-STORM WATER DISCHARGES (NSWDs)

DATE/TIME OF OBSERVATION	SOURCE AND LOCATION OF AUTHORIZED NSWD Example: Air conditioner Units on Building C	NAME OF AUTHORIZED NSWD Example: Air conditioner condensate	DESCRIBE AUTHORIZED NSWD CHARACTERISTICS Indicate weather authorized NSWD is clear, cloudy, or discolored, causing staining, contains floating objects or an oil sheen, has odors, etc.		DESCRIBE ANY REVISED OR NEW BMP’s AND PROVIDE THEIR IMPLEMENTATION DATE
			At the NSWD Source	At the NSWD Drainage Area and Discharge Location	
_____ _____☐ AM ☐ PM					
_____ _____☐ AM ☐ PM					
_____ _____☐ AM ☐ PM					
_____ _____☐ AM ☐ PM					
_____ _____☐ AM ☐ PM					

REPORT – PART A FORM 3 QUARTERLY VISUAL OBSERVATIONS OF UNAUTHORIZED NON-STORM WATER DISCHARGES (NSWDs)

- Unauthorized NSWDs are discharges (such as wash or rinse waters) that do not meet the conditions provided in Section D (pages 5-6) of the General Permit.
- Quarterly visual observations are required to observe current and detect prior unauthorized NSWD.
- Quarterly visual observations are required during dry weather and at all facility drainage areas.
- Each unauthorized NSWD source, impacted drainage area, and discharge location must be identified and observed.
- Unauthorized NSWDs that cannot be eliminated within 90 days of observation must be reported to the Regional Board in accordance with Section A.10.e of the General Permit.
- Make additional copies of this form, as necessary.

QUARTER: **JULY-SEPT.** **DATE/TIME OF OBSERVATIONS** ☐ **AM** ☐ **PM** _____	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs OBSERVED?** **YES** ☐ **NO** ☐ **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NAWDS?** **YES** ☐ **NO** ☐ If **YES**, complete Part B of this form.
QUARTER: **OCT.-DEC.** **DATE/TIME OF OBSERVATIONS** ☐ **AM** ☐ **PM** _____	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs OBSERVED?** **YES** ☐ **NO** ☐ **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NAWDS?** **YES** ☐ **NO** ☐ If **YES**, complete Part B of this form.
QUARTER: **JAN.-MARCH** **DATE/TIME OF OBSERVATIONS** ☐ **AM** ☐ **PM** _____	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs OBSERVED?** **YES** ☐ **NO** ☐ **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NAWDS?** **YES** ☐ **NO** ☐ If **YES**, complete Part B of this form.
QUARTER: **APRIL-JUNE** **DATE/TIME OF OBSERVATIONS** ☐ **AM** ☐ **PM** _____ _	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs OBSERVED?** **YES** ☐ **NO** ☐ **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NAWDS?** **YES** ☐ **NO** ☐ If **YES**, complete Part B of this form.

REPORT
FORM 3 – QUARTERLY VISUAL OBSERVATIONS OR UNAUTHORIZED NON-STORM WATER DISCHARGES (NSWDs)

OBSERVATION DATE (FROM REVERSE SIDE)	**NAME OF UNAUTHORIZED NSWD** Example: Vehicle Wash Water	**SOURCE AND LOCATION OF AUTHORIZED NSWD** Example: NW Corner of Parking Lot	**DESCRIBE UNAUTHORIZED NSWD CHARACTERISTICS** Indicate weather unauthorized NSWD is clear, cloudy, or discolored, causing stains, contains floating objects or an oil sheen, has odors, etc.		**DESCRIBE CORRECTIVE ACTIONS TO ELIMINATE UNAUTHORIZED NSWD AND TO CLEAN IMPACTED DRAINAGE AREAS. PROVIDE UNAUTHORIZED NSWD ELIMINATION DATE**
			AT THE UNAUTHORIZED NSWD SOURCE	**AT THE UNAUTHORIZED NSWD DRAINAGE AREA AND DISCHARGE LOCATION**	
_____ _____☐ AM ☐ PM					
_____ _____☐ AM ☐ PM					
_____ _____☐ AM ☐ PM					
_____ _____☐ AM ☐ PM					
_____ _____☐ AM ☐ PM					

STORM WATER TOPICS DISCUSSED

SUGGESTIONS / COMMENTS

DCM COMMENTS

DCM SIGNATURE	DATE	CONTRACTOR	DATE

SUGGESTED TOPICS FOR DISCUSSION

[ ] PREPARING FOR A STORM EVENT	[ ] GOOD HOUSEKEEPING	[ ] MAINTENANCE POST BMPS
[ ] MAINTAINING STOCKPILES	[ ] SOURCE CONTROL	[ ] CASQA MANUAL
[ ] DUST CONTROL	[ ] DCM ROLE & RESPONSIBILITY	[ ] SWPPP UPDATING
[ ] TRAINING NEW STAFF	[ ] CONTRACTOR ROLE	[ ] SCHEDULING
[ ] RECORD KEEPING	[ ] FREQUENTLY ASKED QUESTIONS	[ ] PREVENTING FLOODING

END OF ATTACHMENTS

SECTION 01 74 16A - SWPPP MONTHLY REPORT

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT TEMPLE ACADEMY PERFORMING ARTS CENTER	*Storm Water Management Monthly Report*		Form SWPPP XXX
	Revision 1.0	Revision Date xx/xx/xx	Effective Date xx/xx/xx

SWPPP Monthly Report

SECTION 01 74 16 A

Storm Water Management Report for: _____ to _____

Month Year (MM / DD / YYYYY) (MM / DD / YYYYY)

Inspection and Monitoring Requirements *Refer to the projects SWPPP for details, such as:* • *Inspection frequencies,* • *Testing parameters, etc.*	Risk Level	Visual Inspections					Sample Collection		Were all required inspections and sampling conducted? Yes[1] ☐ No☐ NA ☐ [1] Attach copies of inspections and sampling reports as applicable
		Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water	
			Baseline	REAP					
	1	X	X		X	X			
	2	X	X	X	X	X	X		
	3	X	X	X	X	X	X	X	

Were there any Storm Water or authorized non-storm water discharges? List the dates of the events: _____	Yes ☐ No☐
Are there loose stockpiled construction materials that are currently not actively being used (i.e., soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.) covered and bermed?	Yes ☐ No ☐ NA☐
Are the site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged implemented and effective?	Yes ☐ No☐
Are the site management (i.e., “housekeeping”) measures for waste management, implemented and effective?	Yes ☐ No☐
Are good housekeeping measures for vehicle storage and maintenance implemented and effective?	Yes ☐ No ☐ NA☐
Is good housekeeping for landscape materials implemented and effective?	Yes ☐ No☐

SECTION 01 74 16A - SWPPP MONTHLY REPORT

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT TEMPLE ACADEMY PERFORMING ARTS CENTER	*Storm Water Management Monthly Report*		Form SWPPP XXX
	Revision 1.0	Revision Date xx/xx/xx	Effective Date xx/xx/xx

Are good housekeeping measures in place on the construction site to control the air disposition of site materials from site operations?	Yes ☐ No☐
Are there any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges?	Yes ☐ No☐
Are measures in place to control all non- storm water discharges during construction and were they effective?	Yes ☐ No☐
Were any vehicles washed done in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems?	Yes ☐ No ☐ NA☐
Are effective wind erosion control measures in place?	Yes ☐ No ☐ NA☐
Are effective soil covers in place for inactive **areas** and all finished slopes, open space, utility backfill, and completed lots?	Yes ☐ No ☐ NA☐
Are effective perimeter controls in place that stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site?	Yes ☐ No ☐ NA☐
Was all run-on, all runoff within the site and all runoff that discharges off the site effectively managed in accordance with the SWPPP?	Yes ☐ No ☐ NA☐
Were all inspection, maintenance repair and sampling activities at the project location performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger?	Yes[1] ☐ No ☐ NA☐ [1] Attach copies of inspections and sampling reports as applicable
Were weekly inspections and observations conducted, including at least one during each 24-hour period during extended storm events? NOTE: Inspectors shall be the QSP or be trained by the QSP.	Yes[1] ☐ No ☐ NA☐ [1] Attach copies of inspections and sampling reports as applicable

SECTION 01 74 16A - SWPPP MONTHLY REPORT

HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT TEMPLE ACADEMY PERFORMING ARTS CENTER	*Storm Water Management Monthly Report*		Form SWPPP XXX
	Revision 1.0	Revision Date xx/xx/xx	Effective Date xx/xx/xx

I, _____, QSP No. _____ the Qualified Stormwater Practitioner for_____
Print first name Print last name project description

Certify the project is in compliance with the Storm Water Pollution Prevention Plan (SWPPP) for this project and the current General Permit For Storm Water Discharges Associated With Construction And Land Disturbance Activities (NPDES NO. CAS000002).

_____ _____
Signature Date

SECTION 01 74 19

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Section Includes: Preparation and implementation, including reporting and documentation, of a Waste Management Plan for reusing, recycling, salvage, or disposal of non-hazardous waste materials generated during demolition and new construction (Construction and Demolition (C&D) Waste), to foster material recovery and re-use and to minimize disposal in landfills. This section includes requirements for submittal of:

a. CONTRACTOR'S Waste Management and Recycling Plan prior to the commencement of the Work.

b. CONTRACTOR'S quantitative reports for demolition waste materials generated by the CONTRACTOR, as a condition of approval of progress payments.

1.02 DEFINITIONS [Note: refer to statutory definitions as required by state or local agencies or use the definitions below]

A. Remove: Remove and legally dispose of items, except those identified for use in recycling, re-use, and salvage programs.

B. Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human or animal life; affect other species of importance to humanity; or degrade the utility of the environment for aesthetic, cultural or historical purposes.

C. Inert Fill: A permitted facility that accepts inert waste such as asphalt and concrete exclusively for the purpose of disposal.

1. Inert Solids/Inert Waste: Non-liquid solid waste including, but not limited to, soil and concrete, that does not contain hazardous substances or soluble pollutants at concentrations in excess of water-quality standards established by a regional water board and does not contain significant quantities of decomposable solid waste.

D. Class III Landfill: A landfill that accepts non-hazardous materials such as household, commercial, and industrial waste, resulting from construction, remodeling, repair, and demolition operations. A Class III landfill must have a solid waste facility permit from the State of California.

E. Demolition Waste: Building materials and solid waste resulting from construction, remodeling, repair, cleanup, or demolition operations that are not hazardous. This term includes, but is not limited to, asphalt concrete, Portland cement concrete, brick, lumber, gypsum wallboard, cardboard and other associated packaging, roofing material, ceramic tile, carpeting, plastic pipe, and steel. The materials may include rock, soil, tree stumps, and other vegetative matter resulting from land clearing and landscaping for construction or land development projects.

F. Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.

G. Recycling: The process of sorting, cleansing, treating and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating, or thermally destroying solid waste.

H. Reuse: The use, in the same or similar form as it was produced, of a material which might otherwise be discarded.

I. Solid Waste: All putrescible and non-putrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition, and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, dewatered, treated, or chemically fixed sewage sludge which is not hazardous waste, manure, vegetable or animal solid and semisolid wastes, and other discarded solid and semisolid wastes. "Solid waste" does not include hazardous waste, radioactive waste, or medical waste as defined or regulated by State law.

1.03 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain property of HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT, demolished materials shall become the CONTRACTOR'S property and shall be removed, recycled, or disposed from Project site in an appropriate and legal manner.

1. Arrange a meeting no less than ten (10) days prior to demolition with the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT or CONSTRUCTION MANAGER and other designated representatives to review any salvageable items to determine if HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT wants to retain ownership and discuss CONTRACTOR'S Waste Management and Recycling Plan.

1.04 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures

B. Qualification Data: For demolition firm.

C. Proposed dust-control measures.

D. Proposed noise-control measures.

E. Schedule of demolition activities indicating the following:

1. Detailed sequence of demolition and removal work, including start and end dates for each activity.

2. Dates for shutoff, capping, and continuation of utility services.

F. If hazardous materials are encountered and disposed of, landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

G. CONTRACTOR'S Waste Management and Recycling Plan:

1. Review Contract Documents and site conditions and estimate total Project Construction and Demolition (C&D) materials to be generated, names of landfills where Project C&D materials would normally be disposed of. Indicate types and quantities of materials under the Work that are anticipated to be feasible for on-site processing, and source-separation for re-use or recycling. Indicate procedures

that will be implemented in this program to effect jobsite source- separation, such as, identifying a convenient location where dumpsters would be located, signage to identify materials to be placed in dumpsters, etc.

2. Prior to commencing the Work, CONTRACTORS shall submit the Waste Management and Recycling Plan. Waste Management and Recycling Plan must include, but not be limited to, the following:

   a. CONTRACTOR'S name and project identification information.

   b. Procedures to be used.

   c. Materials to be re-used and recycled.

   d. Estimated total quantities of materials generated in Project.

   e. Names and locations of landfills, re-use, and recycling facilities/sites.

   f. Tonnage calculations that demonstrate that CONTRACTOR will re-use and recycle a minimum of 65% by weight of C&D materials generated in the Work.

3. CONTRACTOR'S Waste Management and Recycling Plan must be approved by HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT and CONSTRUCTION MANAGER prior to the Start of Work.

4. CONTRACTOR'S Waste Management and Recycling Plan will not otherwise relieve the CONTRACTOR of responsibility for adequate and continuing control of pollutants and other environmental protection measures.

H. CONTRACTOR'S Reuse, Recycling, and Disposal Report

1. Submit CONTRACTOR'S Reuse, Recycling, and Disposal Report on the form provided with each application for progress payment. Failure to submit the form and its supporting documentation will render the application for progress payment incomplete and delay progress payments. If applicable, include manifests, weight tickets, receipts, and invoices specifically identifying the Project for re-used and recycled materials:

   a. On-site crushing of asphalt and concrete for use off-site.
   b. Reuse of building materials or salvageable items.
   c. Source-separated recycling facilities.
   d. Mixed debris recycling facilities.
   e. Recycling of material, including soils, as landfill alternative daily cover.
   f. Delivery of soils or mixed inserts to an inert landfill or other use.
   g. Disposal of soils or other materials at a landfill or transfer station.

2. CONTRACTOR'S Reuse, Recycling, and Disposal Report must quantify all materials generated in the Work, disposed in Class III Landfills, or diverted from disposal through recycling. Indicate zero (0) if there is no quantity to report for a type of material. As indicated on the form:

   a. Report disposal or recycling either in tons or in cubic yards: if scales are available at disposal or recycling facility, report in tons; otherwise, report in cubic yards. Report in units for salvage items when no tonnage or cubic yard measurement is feasible.

   b. Indicate locations to which materials are delivered for reuse, salvage, recycling, accepted as daily cover, inert backfill, or disposal in landfills or transfer stations.

c. Provide legible copies of weigh tickets, receipts, or invoices that specifically identify the project generating the material. Said documents must be from recyclers and/or disposal site operators that can legally accept the materials for the purpose of re-use, recycling, or disposal.

d. Indicate project title, project number, progress payment number, name of company completing the CONTRACTOR'S Report and compiling backup documentation, the printed name, signature, and daytime phone number of the person completing the form, the beginning and ending dates of the period covered on the CONTRACTOR'S Report, and the date that the CONTRACTOR'S Report is completed.

I. At Project Closeout:

1. Record drawings: Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Engage a licensed demolition CONTRACTOR and an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction. Obtain and pay for all permits required.

C. Pre-demolition Conference: Conduct conference at Project site.

1. Review the environmental goals of this Project with CONTRACTORS, SUBCONTRACTORS, and waste haulers and make a proactive effort to increase awareness of these goals among all labor forces on site.

1.06 PROJECT CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of Work.

B. Storage or sale of removed items or materials on-site will not be permitted without advance written approval from CONSTRUCTION MANAGER.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of demolition and recycling required.

C. Survey condition of the building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition.

1. Retain a licensed and qualified civil or structural engineer to provide analysis, including calculations, necessary to ensure the safe execution of the demolition work.

D. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

3.02 PREPARATION

A. As part of the project scope, the CONTRACTOR shall prepare all drawings, documents, and applications and shall obtain all government agency approvals and permits required for demolition activities.

B. Conduct demolition operations and remove C&D materials to ensure minimum interference with roads, streets, walks, and other adjacent occupied and utilized facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or utilized facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.

a. Maintain temporary protection to people at exterior areas of the existing building where decorative medallion removal work is being done.

2. Protect existing site improvements, appurtenances, and landscaping that are designated to remain in place.

D. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of buildings to be demolished and adjacent buildings to remain.

1. Strengthen or add new supports when required during progress of demolition.

3.03 EXPLOSIVES

A. Explosives: Use of explosives will not be permitted.

3.04 ENVIRONMENTAL CONTROLS

A. Comply with federal, state, and local regulations pertaining to water, air, solid waste, recycling, chemical waste, sanitary waste, sediment, and noise pollution.

B. Protection of Natural Resources: Preserve the natural resources within the project boundaries or restore to an equivalent condition.

1. Confine demolition activities to areas defined by public roads, easements, and work area limits indicated on the drawings.

a. Temporary Construction: Remove indications of temporary construction facilities, such as haul roads, work areas, structures, stockpiles, or waste areas.

2. Water Resources: Comply with applicable regulations concerning the direct or indirect discharge of pollutants to underground and natural surface waters.

a. Oily Substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water in such quantities as to affect normal use, aesthetics, or produce a measurable ecological impact on the area.

1) Store and service construction equipment at areas designated for collection of oil wastes.

3. Dust Control, Air Pollution, and Odor Control: Prevent creation of dust, air pollution and odors.

   a. Use temporary enclosures and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.

   b. Store volatile liquids, including fuels and solvents, in closed containers.

   c. Properly maintain equipment to reduce gaseous pollutant emissions.

4. Noise Control: Perform demolition operations to minimize noise.

   a. Repetitive, high level impact noise will be permitted in accordance with local and state ordinances. Repetitive impact noise on the property shall not exceed the following dB limitations:

Sound Level in dB	Time Duration of Impact Noise
70	More than 12 minutes in any hour
80	More than 3 minutes in any hour

   b. Provide equipment, sound-deadening devices, and take noise abatement measures that are necessary to comply with the requirements of this Contract.

   c. At least once every five (5) successive working days while work is being performed above 55 dB noise level, measure sound level for noise exposure due to the demolition. Measure sound levels on the 'A' weighing network of a General-Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, measurements may be taken 3 to 6 feet in front of any building face. Submit the recorded information to the State noting any problems and the alternatives before mitigating actions.

5. Salvage, Re-Use, and Recycling Procedures

   a. Identify re-use, salvage, and recycling facilities.

   b. Develop and implement procedures to re-use, salvage, and recycle demolition materials, based on the Contract Documents, the CONTRACTOR'S Waste Management and Recycling Plan, estimated quantities of available materials, and availability of recycling facilities. Procedures may include on- site recycling, source-separated recycling, salvage, and/or mixed debris recycling efforts.

   c. Identify materials that are feasible for salvage, determine requirements for site storage, and transportation of materials to a salvage facility.

   d. Source-separate construction, excavation and demolition materials including, but not limited to the following types:

      1. Asphalt

      2. Concrete, Concrete Block, Concrete Masonry Units (CMU), Slump Stone (Decorative Concrete Block), and Rocks

      3. Asphalt Concrete

      4. Paper: Bond, Newsprint, Cardboard, Paper, Packing Materials, and Packaging

5. Cement Fiber Products: Shingles, Panels, Siding

6. Paint

7. Rigid Foam

8. Glass

9. Plastics

10. Carpet and Carpet Padding

11. Beverage Containers

12. Insulation

13. Gypsum Board

14. Porcelain Plumbing Fixtures

15. Fluorescent Light Tubes: per Department of Toxic Substances Control Regulations

16. Green Materials (i.e., tree trimmings and land clearing debris)

17. Metal (ferrous and non-ferrous)

18. Red Clay Brick

19. Soil

20. Wood, Clean Dimensional Wood, Pallet Wood

21. Sheet Wood: Plywood, Oriented Strand Board (OSB), Particle Board

22. Other materials as appropriate

e. Develop and implement a program to transport loads of mixed (commingled) demolition materials that cannot be feasibly source separated to a mixed material recycling facility [whenever available].

6. DISPOSAL PRACTICES AND WASTE HAULING

a. Legally transport and dispose of materials that cannot be delivered to a source-separated or mixed recycling facility to a transfer station or disposal facility that can legally accept the materials for the purpose of disposal.

b. Use a permitted waste hauler or CONTRACTOR'S trucking services and personnel. To confirm valid permitted status of waste haulers, contact the State of California.

c. Become familiar with the conditions for acceptance of new construction, excavation, and demolition materials at recycling facilities, prior to delivering materials.

d. Deliver to facilities that can legally accept new construction, excavation, and demolition materials for purpose of re-use, recycling, composting, or disposal.

e. Do not burn, bury, or otherwise dispose of rubbish and waste materials on project site.

7. RE-USE AND DONATION OPTIONS

a. Implement a re-use program to the greatest extent feasible.

8. REVENUE

a. Revenues or other savings obtained from recycled, re-used, or salvaged materials shall accrue to CONTRACTOR unless otherwise noted in the Contract Documents.

b. Remove and transport C&D materials in a manner that will prevent spillage on adjacent surfaces, streets, and areas or dust being emitted into the atmosphere.

c. Clean adjacent streets of dust, dirt, and C&D materials caused by demolition operations. At the end of each workday, return adjacent areas to condition existing before start of demolition.

3.05 DEMOLITION

A. Building Demolition: Demolish buildings completely and remove from the site. Use methods required to complete Work within limitations of governing regulations and as follows:

1. Locate demolition equipment throughout the building and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

2. Demolish concrete and masonry in sizes that will be suitable for acceptance at recycling or disposal facilities.

3. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

4. Break up and remove concrete slabs on grade in small sizes, suitable for acceptance at recycling or disposal facilities, unless otherwise shown to remain.

5. Remove all disconnected, abandoned utilities on site.

B. Below-Grade Construction: Demolish foundation walls and other below-grade construction, as follows:

1. Completely remove below-grade construction, including foundation walls and footings.

2. Break up and completely remove below-grade concrete slabs, in small sizes, suitable for acceptance at recycling or disposal facilities.

3. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations to street level with satisfactory soil materials.

C. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.

3.06 HANDLING OF DEMOLISHED MATERIALS

A. General: Promptly re-use, salvage, recycle, or dispose of demolished materials. Do not allow demolished materials to accumulate or be stored on-site for more than ten (10) days.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S property and legally reuse, salvage, recycle, or dispose of materials.

END OF SECTION

SECTION 01 74 23

FINAL CLEANING REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for final cleaning at Completion.

1.02 RELATED DOCUMENTS

A. Drawings, Specifications, and provisions of Construction Contract, including General, Special Conditions and other General Requirements.

1.03 RELATED SECTIONS

A. Other Division 01 Specification Sections including, but not limited to, following:

1. Section 01 50 00 - Construction Facilities and Temporary Controls

2. Section 01 77 00 - Contract Closeout Procedures

3. Special cleaning requirements for specific construction elements are included in appropriate Sections of the Project Specifications.

1.04 QUALITY ASSURANCE

A. General CONTRACTOR is responsible for final cleaning. General CONTRACTOR is responsible for coordinating final cleaning of an area or piece of equipment with their sub-CONTRACTORS and vendors.

1.05 SITE CONDITIONS

A. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with Applicable Laws, including, and without limitation, Regulatory Authorities for safety procedures and Environmental Laws.

1. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.

2. Burning or burying of debris, rubbish, or other waste material on premises is not permitted.

3. Do not use HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S trash facilities.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to condition expected from commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

B. Complete following cleaning operations applicable to Project before requesting inspection for certification of Completion for entire Project or portion of Project.

1. Clean Site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and foreign substances.

2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to smooth, even-textured surface.

3. Remove petrochemical spills, stains, and other foreign deposits.

4. Remove tools, construction equipment, machinery, and surplus material from Site.

5. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to original condition.

6. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

7. Clean debris from roofs, gutters, downspouts, and drainage systems.

8. Broom clean concrete floors in unoccupied spaces.

9. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo, if required.

10. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

11. Remove labels that are not permanent labels.

12. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

13. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

14. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.

15. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

16. Clean ducts, blowers, and coils if units were operated without filters during construction.

17. Clean food-service equipment to sanitary condition, ready and acceptable for intended use.

18. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency and to remove fingerprints from reflective surfaces. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.

19. Leave Site and Work clean and ready for occupancy.

C. Engage experienced, licensed exterminator to make final inspection and rid Site and Work of rodents, insects, and other pests. Comply with regulations of Governmental Authorities.

D. Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction period.

E. Comply with Applicable Laws governing cleaning operations. Remove waste materials from site and dispose of lawfully.

1. Where excess salvage materials or extra materials of value remain after Final Completion of Work, they become HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT'S property. Dispose of these materials as directed by CONSTRUCTION MANAGER.

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section includes administrative and procedural requirements for Contract Closeout, including but not limited to, the following:

1. Inspection procedures.

2. Project record documents submittal.

3. Operation and maintenance manual submittal.

4. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT orientation and instruction.

5. Final cleaning.

1.02 RELATED REQUIREMENTS:

A. Section 01 29 76 - Progress Payment Procedures.
B. Section 01 32 13 - Construction Schedule.
C. Section 01 33 00 - Submittal Procedures.
D. Section 01 50 00 - Construction Facilities and Temporary Controls.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 COMPLETION

A. Inspection Procedures: On notice from the CONTRACTOR that it believes the Project is Complete, CONSTRUCTION MANAGER will authorize commencement of inspection. INSPECTOR, CONSTRUCTION MANAGER, CONTRACTOR, and ARCHITECT will inspect the Work.

1. If after inspection of the Work, CONSTRUCTION MANAGER does not consider the Work complete, CONSTRUCTION MANAGER will notify CONTRACTOR.

2. If after inspection, CONSTRUCTION MANAGER considers the Work complete, INSPECTOR shall prepare a comprehensive Punch List of items to be corrected.

a. INSPECTOR may repeat inspection to assure the Work is corrected.

b. Results of the completed inspection will form a partial basis of the requirements for Release of Retention.

3.02 ADMINISTRATIVE CLOSEOUT

A. Re-inspection Procedures: INSPECTOR, CONSTRUCTION MANAGER, CONTRACTOR, and ARCHITECT may inspect the Work upon notice, including final inspection of Punch List items from earlier inspections, has been corrected, except for items whose completion is delayed under circumstances acceptable to CONSTRUCTION MANAGER.

1. HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT has the right to preclude CONTRACTOR from Punch List correction and documents submittals after the Contract Completion date; unless HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT elects to authorize CONTRACTOR to extend Administrative Contract duration. CONTRACTOR will be assessed actual cost for the unsettled items. Withholds amounts exceeding actual costs to correct or to obtain deliverable will be released.

2. If allowed by the CONSTRUCTION MANAGER, re-inspection will be repeated, but may be assessed against CONTRACTOR if HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT is subject to additional professional service and or additional costs of inspection.

3.03 PROJECT RECORD DOCUMENT SUBMITTAL

A. General: Do not use project record documents for construction purposes. Protect record documents from deterioration and loss. Provide access to record documents for ARCHITECT, INSPECTOR, and CONSTRUCTION MANAGER reference during normal working hours. Project record document shall be updated on a weekly basis. Prior to submitting each application for payment, secure INSPECTOR and ARCHITECT approval of project record documents.

B. Record Drawings: Maintain a clean, undamaged set of prints of Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the Drawing that is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Drawings. Provide detailed and accurate field dimensions for concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work. Date and number entries in the same format as submitted. Call attention to entry by a “cloud” around the affected areas.

2. Mark new information important to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT but was not shown on Drawings or Shop Drawings.

3. Utility location and depth below finished grade and above ceilings and attic spaces shall be fully dimensioned and indicated on record drawings. Dimensions shall be measured from building lines or permanent landmarks and shall be triangulated to those features.

4. Note related Change Order or Construction Directive numbers where applicable. RFC submissions shall be referenced on each affected sheet, Drawing and Shop Drawing.

5. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.

6. Prior to Contract Completion of the Work, review of the project record drawings by ARCHITECT; prepare a final set of project record drawings using bond paper. Submit final set in a hard copy and a digital copy on a CD-ROM to ARCHITECT.

C. Record Specifications: Maintain two (2) complete copies of the Specifications, including Addenda. Include with the Specifications two (2) copies of other written Contract Documents, such as Change Orders or Construction Directives issued during construction.

1. Mark these record documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.

2. Give particular attention to substitutions and selection of options and information on concealed Work that cannot otherwise be readily discerned later by direct observation.

3. Note related record document information with Product Data.

4. Prior to Contract Completion of the Work, submit record Specifications to ARCHITECT for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT records.

D. Record Product Data: Maintain two (2) copies of each Product Data submittal. Note related Change Orders and Construction Directives and mark-up of record drawings and Specifications.

1. Mark these documents to illustrate significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the Project site and from the manufacturer's installation instructions and recommendations.

2. Provide detailed and accurate information regarding concealed products and portions of Work that cannot otherwise be readily discerned later by direct observation.

3. Prior to Contract Completion, submit complete set of record Product Data to ARCHITECT for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT records.

E. Record Samples: Immediately prior to Completion, CONTRACTOR shall meet with ARCHITECT and CONSTRUCTION MANAGER at the Project site to determine which Samples are to be transmitted to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT for record purposes. Comply with CONSTRUCTION MANAGER instructions regarding delivery to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT storage area.

F. Miscellaneous Records: Refer to other Specification sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Prior to the date of Contract Completion, complete and compile miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to ARCHITECT for HACIENDA LA PUENTE UNIFIED DISTRICT records.

G. Maintenance Manuals: Prior to Completion, organize operation and maintenance data into suitable two sets of manageable size. Bind properly indexed data in individual, heavy-duty, two to three-inch 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. **Submit binders and digital files on a flash drive** to ARCHITECT for HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT records. Include the following types of information.

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring diagrams.
5. Recommended "turn-around" cycles.
6. Inspection procedures.
7. Shop Drawings and Product Data.
8. Fixture lamping schedule.

H. Verified Reports: Construction progress of the Work shall be reported to HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT via a duly verified report as per Title 24, Part 1, Sections 4-336 and 4-343.c of the California Building Standards Commission's, California Administrative Code.

3.04 NOT USED

3.05 FINAL CLEANING

A. General: Related sections of the Contract Documents specify general cleaning during performance of the Work. General cleaning is included in Division 01 Section “Construction Facilities and Temporary Controls”.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer’s instructions.

1. Complete the following cleaning operations before requesting inspection to determine Project Completion.

a. Remove labels that are not permanent labels.

b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

c. Clean exposed exterior and interior hard-surfaced finished to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

e. Clean the Project site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.

END OF SECTION

SECTION 01 78 36

WARRANTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section includes administrative and procedural requirements for warranties, including manufacturers and installer's standard warranties on products and special product warranties.

1. Refer to the General Conditions for terms of the guarantee period for the Work.

1.02 RELATED REQUIREMENTS

A. Section 01 7700 - Contract Closeout.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 WARRANTY REQUIREMENTS

A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties shall not relieve CONTACTOR of the warranty of the Work incorporating such materials, products, and equipment. Manufacturer's disclaimers and limitations on warranties do not relieve suppliers, manufacturers, installers, and Subcontractors of the requirement to countersign special warranties with CONTRACTOR.

B. Standard warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to OWNER.

C. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for OWNER.

D. Related Damages and Losses: When correcting failed or defective warranted Work, remove and replace Work that has been damaged as a result of such failure or which must be removed and replaced to provide access for correction of warranted Work.

E. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement with the reinstated warranty equal to the original warranty.

F. Replacement Cost: Upon determination the Work covered by a warranty has failed and/or is defective, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. CONTRACTOR is responsible for the cost of replacing or rebuilding defective Work regardless of whether OWNER has benefited from use of the Work through a portion of its anticipated useful service life.

G. OWNER Recourse: Expressed warranties made to OWNER are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which OWNER can enforce such other duties, obligations, rights, or remedies.

H. Rejection of Warranties: OAR reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

I. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, OAR reserves the right to refuse to accept the Work until CONTRACTOR presents evidence the entities required to countersign such commitments have done so.

3.02 SUBMITTALS

A. Submit written preliminary warranties prior to Substantial Completion and final warranties prior to Contract Completion. If the certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, submit written warranties as set forth in the certificate of Substantial Completion.

1. When a designated portion of the Work is partially used and/or occupied by OWNER, submit properly executed warranties to ARCHITECT within fifteen (15) days of the Partial Use or Occupancy of the designated portion of the Work.

B. When the Contract Documents require CONTRACTOR, or CONTRACTOR and a Subcontractor, installer, supplier, or manufacturer to execute a special warranty, prepare a written document containing appropriate terms and identification, ready for execution by the required parties. Submit a draft to OAR, through the ARCHITECT, for approval prior to final execution.

1. Refer to Divisions 02 through 33 for specific content requirements and particular requirements for submitting special warranties.

C. Form of Submittal: Prior to Contract Completion, compile two (2) copies of each required final warranty properly executed by CONTRACTOR, or by CONTRACTOR and Subcontractor, installer, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the Specifications.

D. Bind warranties and bonds in heavy-duty, commercial-quality, durable three ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8½ by 11" papers.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the item or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.

2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title and/or name, and name of CONTRACTOR.

3. When warranted Work requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Construction Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Contract General Conditions and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Requirements for Project Record Documents to be submitted for Contract closeout.

1.03 RELATED SECTIONS

A. Section 01 33 00 - Submittals Procedures: General requirements for submission for shop drawings, product data, samples, and quality control reports.

1.04 PROJECT RECORD DOCUMENTS

A. Project Record Documents, General: CONTRACTOR shall not use Record Documents for construction purposes. CONTRACTOR shall protect from deterioration and loss in a secure, fire-resistive location; provide access to Record Documents for the Trustees' and the ARCHITECT'S reference during normal working hours.

B. Record Drawings: CONTRACTOR shall record information continuously as Work progresses. CONTRACTOR shall not conceal Work permanently until all required information is recorded. CONTRACTOR shall:

1. Maintain a clean, undamaged set of blue or black line white prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately.

2. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

3. Legibly and to scale, mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the work.

4. Mark new information that is important to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT but was not shown on Contract Drawings or Shop Drawings. Record actual construction, including:

a. Measured depths of foundations and footings encountered, measured in relation to finish First Floor datum.

b. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent ground improvements.

c. Field changes of dimension and detail.

d. Details not on original Contract Drawings. Application of copies of details produced and provided by ARCHITECT during construction will be accepted.

e. Permanent Room names and Room numbers.

5. Note related Change Order numbers where applicable.

6. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set.

7. Store Record Documents separate from documents used for construction.

C. Record Specifications: CONTRACTOR shall record changes made by Addenda and Change Orders. In PART 2 - PRODUCTS in each Section, CONTRACTOR shall legibly mark and record in red ink actual Products installed or used, including:

1. Manufacturer's name and product model or catalog number.

2. Product substitutions or alternates utilized.

D. Submission:

1. CONTRACTOR shall keep Project Record Documents current, as they will be reviewed for completeness by ARCHITECT, INSPECTOR, and CONSTRUCTION MANAGER as condition for certification of each Progress Payment Application.

2. Prior to the date of the Notice of Completion, CONTRACTOR shall submit marked Record Documents to ARCHITECT for review, approval, and further processing.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

1.01 CONTRACTOR AS-BUILT DOCUMENTATION PROCESS

A. Require monthly reviews by the superintendent, IOR, and ARCHITECT/ENGINEER.

B. Require all changes including but not limited to, RFIs, ASIs, Field Instructions and field changes be added to the construction documents (conform set), including plans and specs. All revisions issued in 8 1/2 x 11" format to be reduced to 50% and adhered to the construction document with red ink identifying the location on the documents where the revision occurs.

C. Submit as-built documents to the ARCHITECT every three (3) months. A copy shall be provided by the CONTRACTOR monthly prior to approval of the pay application.

D. For all underground work, the CONTRACTOR shall provide base dimensions from the utility to a fixed structural part of the project, such as a foundation edge, street curb, or other non-movable object.

E. All deferred submittals such as fire protection plans, shall be provided to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT in AutoCAD format as required in 3 below.

F. At project close out the CONTRACTOR shall turn over the as-built documents to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

1.02 ARCHITECT AS-BUILT DOCUMENTATION PROCESS

A. Drawing sheets with three or more changes shall be re-issued to the CONTRACTOR and HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT as revised construction documents and inserted into the construction documents (conform set).

B. At project close out the ARCHITECT/ENGINEER shall complete all as-built document revisions in AutoCAD and turn over the as-built documents to the HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT.

SECTION 01 79 00

MAINTENANCE AND OPERATIONS STAFF DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for training DISTRICT personnel including, but not limited to:

1. Demonstration of operations of systems, subsystems, and equipment.

2. Training in operation and maintenance of systems, subsystems, and equipment.

1.02 RELATED REQUIREMENTS

A. CAL/OSHA Minimum Ventilation Standard, Title 8, Section 5142.
B. California Building Code, Chapter 12.
C. Division 01 - General Requirements.
D. Division 22 and 23 Specifications.
E. Division 26 and 27 Specifications.

1.03 SUBMITTALS

A. Instruction Program:

1. Ninety (90) days prior to Startup and Testing, submit a draft outline of the instructional program for demonstration and training, including the training module objectives and outline for each training module, schedule of proposed training dates, training times, length of instruction time and instructors' names for each training module. Submittal(s) shall be on a CD-ROM in a MS Word 2010 format file. AOR and INSPECTOR shall review, and OAR accept, based on their recommendation, CONTRACTOR'S proposed Instruction Program or comment and return to CONTRACTOR for revision and incorporation of comments within thirty (30) days of receipt.

2. Revise and resubmit finalized Instruction Program forth-five (45) days prior to Startup and Testing. AOR and INSPECTOR shall review CONTRACTOR'S revised Instruction Program and OAR, based on their recommendation, accept, or return for further revision and incorporation of unaddressed revisions and/or comments or unacceptable revisions within five (5) days of receipt.

3. Revise and incorporate comments and resubmit to OAR within five (5) days of receipt. AOR and INSPECTOR shall review CONTRACTOR'S revised Instruction Program and OAR, based on their recommendation, accept the revised Instruction Program within five (5) days of receipt or require CONTRACTOR to meet with OAR within five (5) days of receipt to revise and incorporate unaddressed revisions and/or comments.

B. Upon completion of training, submit two (2) complete training manuals for DISTRICT'S use and one CD-ROM including materials in the complete training manual in the Adobe PDF format. Each manual shall contain specific training and instruction manuals and hand-outs for the following designated end-users:

1. School Faculty and Administration.

2. School Plant Manager.

3. DISTRICT Maintenance and Operations Personnel.

C. Qualification Data: Three (3) weeks prior to start of training, CONTRACTOR shall submit Letters of Qualifications and Project Lists for persons and firms providing instruction including:

1. Training Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel and end-users in training program similar to that required for this Project, and who has record of successful training performance.

2. Training Instructor Qualifications: Instructor shall be factory-authorized service representative, experienced in operation and maintenance procedures and training for each system, subsystem, or piece of equipment.

3. References: The name of owner and the name and telephone number of the plant manager and maintenance supervisor on three (3) similar projects for reference.

D. Attendance Record: For each training module, submit the proposed list of participants, sign in sheets and length of instruction time a minimum of fifteen (15) days prior to start of training of the module.

E. Evaluations: For each participant and for each training module, submit results and documentation of performance-based tests a minimum of seven (7) days following completion of training of each module.

F. Demonstration and Training Video: CONTRACTOR shall video record each classroom training and demonstration session and submit a copy on CD-ROM or DVD in a format compatible with MS Windows Media Player at end of each training module. CONTRACTOR shall include a copy of any manufacturer training video materials presented during training and demonstration session.

1.04 COORDINATION

A. Coordinate instruction schedule with the OAR and DISTRICT's O&M personnel. Adjust schedule as required to reasonably accommodate the schedules of participants and to minimize disrupting DISTRICT operations.

B. Coordinate with instructors, including providing notification of scheduled dates, times, length of instruction time and course content.

C. Coordinate content of training modules with content of approved Emergency Manual and Operations and Maintenance Manual. Do not submit instruction program until manual has been reviewed and accepted by the OAR.

PART 2 - PRODUCTS

2.01 INSTRUCTION PROGRAM

A. Program Structure: Develop instruction program that includes individual demonstration and training modules for the operation, maintenance, minor repair (completion in under two hours) and calibration of systems and components in the system as required by Section 01 9113, Divisions 22 and 23 and Division 26 and as specified in Part 3 of this Section, "DEMONSTRATION AND TRAINING".

B. Training Modules: Develop learning objective and teaching outline for each module, specific and as applicable, for the following DISTRICT personnel:

1. School Faculty and Administration.

2. School Plant Manager.

3. DISTRICT Operations and Maintenance Personnel.

C. Include description of specific skills and knowledge that participant is expected to master.

D. For each module, include instruction for the following:

1. Basis of System Design (for DISTRICT Operations and Maintenance Personnel), Operational Requirements and Criteria, including, but not limited to:

a. System, subsystem, and equipment descriptions.

b. Performance and design criteria if CONTRACTOR is delegated design responsibility.

c. Operating standards.

d. Regulatory requirements.

e. Equipment function.

f. Operating characteristics.

g. Limiting conditions.

h. Performance curves.

2. Documentation (for DISTRICT Operations and Maintenance Personnel and School Plant Manager): Review in detail the following documentation:

a. Emergency manuals.

b. Operations manuals.

c. Maintenance manuals.

d. Project Record Documents.

e. Identification systems.

f. Warranties.

g. Maintenance service agreements and similar continuing commitments.

3. Emergencies (for DISTRICT Operations and Maintenance Personnel and School Plant Manager): Review, without limitation, the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.

b. Instructions on stopping.

c. Shutdown instructions for each type of emergency.

d. Operating instructions for conditions outside of normal operating limits.

e. Sequences for electric or electronic systems.

f. Special operating instructions and procedures.

4. Operations (for DISTRICT Operations and Maintenance Personnel and School Plant Manager): Review, without limitation, the following as applicable:

a. Startup procedures.

b. Equipment or system break-in procedures.

c. Routine and normal operating instructions.

d. Regulation and control procedures.

e. Control sequences.

f. Safety procedures.

g. Instructions on stopping.

h. Normal shutdown instructions.

i. Operating procedures for system, subsystem, or equipment failure.

j. Seasonal and weekend operating instructions.

k. Required sequences for electric or electronic systems.

l. Special operating instructions and procedures.

5. Adjustments (for DISTRICT O&M Personnel): Review, without limitation, the following as applicable:

a. Alignments.

b. Checking adjustments.

c. Noise and vibration adjustments.

d. Economy and efficiency adjustments.

6. Troubleshooting (for DISTRICT Operations and Maintenance Personnel): Review, without limitation, the following as applicable:

a. Diagnostic instructions.

b. Test and inspection procedures.

7. Maintenance (for DISTRICT Operations and Maintenance Personnel and Plant Manager): Review, without limitation, the following, as applicable:

a. Inspection procedures.

b. Types of cleaning agents to be used and methods of cleaning.

c. List of cleaning agents and methods of cleaning detrimental to product.

d. Procedures for routine cleaning.

e. Procedures for preventative maintenance.

f. Procedures for routine maintenance.

g. Instruction on use of special tools.

8. Repairs (for DISTRICT Operations and Maintenance Personnel): Review, without limitation, the following as applicable:

a. Diagnostic instructions.

b. Repair instructions.

c. Disassembly; component removal, repair and replacement and reassembly instructions.

d. Instructions for identifying parts and components.

e. Review of parts needed for operation and maintenance.

9. Faculty Member Training

a. Manual for the basic operation/control of the HVAC room sensor/thermostat and lighting controls.

b. Organizational chart structure, to be completed by DISTRICT, for any repair or emergency requests for the systems including contact information of the Plant Manager.

PART 3 - EXECUTION

3.01 PREPARATION

A. Training Facilitator: Engage qualified training facilitator no later than 120 days prior to start of training to prepare instruction program and training modules, to coordinate instructors, and to coordinate between CONTRACTOR, OAR for number of participants, instruction times and location.

B. Training Instructor: Engage qualified training instructors to instruct DISTRICT'S personnel to adjust, operate and maintain systems, subsystems, and equipment not part of a system no later than thirty (30) days prior to start of training of assigned modules.

C. Scheduling: Provide instruction at mutually agreed on times.

1. Schedule training with DISTRICT, through OAR, with at least two (2) weeks advance notice.

2. Schedule training to conform to personnel availability at Site and be conducted after the Pre-functional Equipment Checklist (PEC) is completed but prior to Functional Performance Test (PFT) of the equipment and system.

3. Base duration of training on hours specified in the applicable specifications or minimums defined in Article 3.03.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of oral, written, demonstration, or combination of oral, written, and demonstration-based testing.

E. Demonstration and Training Video: Record each training module separately. Include classroom instructions and demonstrations, board diagrams and other visual aids, excluding attendee practice or testing.

1. Make demonstration and testing videos at Site to ensure video is representative of installed system.

a. As part of training, devote one lesson plan to reviewing of video to allow new employees to view the video recordings at their own convenience and be able to operate the video system without need for instructor attendance.

2. At the beginning of each video recording for the training module, incorporate a chart presenting the learning objective and lesson outline.

F. In addition to technical training, attendees shall be trained on how to provide future training for new employees.

G. Familiarize DISTRICT staff regarding CAL/OSHA Title 8, Section 5142 Requirements.

H. Cleanup: Collect excess copies of educational materials and give to OAR. Remove instruction equipment. Restore systems and equipment to condition existing just before commencing training.

3.02 OPERATIONS AND MAINTENANCE MANUALS

A. CONTRACTOR shall direct Subcontractors to compile and prepare O&M Manuals and other required documentation for the equipment and systems that are provided and/or installed per their scope of work for submittal to OAR prior to project closeout.

B. The OAR shall receive a copy of the Operations and Maintenance manuals in prior to initiation of all demonstration and training for review and acceptance or rejection.

C. Operations and Maintenance manuals shall meet the respective requirements of Divisions 22 and 23, Division 26, and Section 01 7700; and comply with the following:

1. Quantity: two (2).

2. Format: 8 ½” by 11” loose leaf binders. Each binder shall be clearly labeled on the spine and meet the requirements of Section 01 7700. Dividers shall be made of card stock with permanently marked index tabs to separate each section and sub section. Tab labels shall not be handwritten. Binders will meet other formatting requirements as outlined in DIVISIONS 02 to 33, as applicable.

3. Contents: There shall be a title page and table of contents at the beginning of each binder. The table of contents will be an outline that identifies the equipment or systems documentation included in the binder and references the specification sections relating to the equipment and systems that are being included in each part of the binder. Each part of the binder will contain the information described below, in the following order.

a. CONTRACTOR. The first page shall contain the name, address, and telephone number of the manufacturer and installing CONTRACTOR, as well as the 24-hour number for emergency service for each piece of equipment identified in this section.

b. Preventive Maintenance Instructions. This section lists the location of preventative maintenance instructions. The list shows the piece of equipment, the Operations and Maintenance document name, and the O&M document page number that contains the instructions.

c. Submittal and Product Data. This section shall include product data not covered by manufacturer's Operations and Maintenance instructions and associated shop drawings.

d. Warranty and Service Contracts. This section shall include the following for each piece of equipment, as applicable:

1) Copy of the equipment warranty information provided as part of Section 01 7836.

2) Additional Warranties in accordance with Warranty requirements in DIVISIONS 02 to 33, as applicable. Equipment Warranties shall clearly list requirements to maintain the Warranty in effect, conditions or acts that would invalidate or void the Warranty, and Warranty expiration date.

3) Service contracts issued. Contracts shall clearly indicate contract dates and scope of work included.

e. Operation and Maintenance Instructions. These shall be the written manufacturer's maintenance and operating instructions with the model number and features of the installed equipment or system clearly identified. This section shall include applicable data on the following:

1) Installation, startup, and break-in instructions.

2) Starting, normal shutdown, emergency shutdown, manual operation, seasonal changeover and normal operating procedures and data, including any special limitations.

3) Operations and Maintenance and installation instructions that were shipped with the unit.

4) Preventative maintenance and service procedures and schedules.

5) Troubleshooting procedures.

6) A parts list, edited to omit reference to items which do not apply to this installation.

7) A list of any special tools required to service or maintain the equipment.

8) Performance data, ratings, and curves.

f. Control Drawings. This section contains controls drawings and the final sequence of operations, set points, and schedules as set during the Commissioning Process. If shop drawings, portions of the project manual, or record drawings clearly show this information, a copy of this information may be inserted. Otherwise, original drawings must be generated and included in this section.

D. Division 23 Special Water and Air Balance Documentation. The Balancing CONTRACTOR will compile and submit the following with other documentation that may be specified elsewhere in the Project Specifications.

1. Final report containing an explanation of the methodology, assumptions, test conditions, and the results in a clear format with designations of all uncommon abbreviations and column headings.

2. The TAB Subcontractor shall mark on the drawings where all traverse and other critical measurements were taken and cross reference the location in the TAB report.

END OF SECTION

SECTION 02 4116

DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Furnishing labor, materials and equipment necessary for demolition, dismantling, cutting and alterations as indicated, specified, or required for completion of the Work. Includes items such as the following:

1. Protection of existing improvements to remain.

2. Cleaning existing improvements to remain.

3. Disconnecting and capping utilities.

4. Removing debris, waste materials, and equipment.

5. Removal of items for performance of the Work.

6. Salvageable items to be retained by the Owner.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating the extent of items and systems to be removed. Indicate items to be salvaged or items to be protected during demolition. Indicate locations of utility terminations and the extent of abandoned lines to be removed. Include details indicating methods and location of utility terminations.

1.03 QUALITY ASSURANCE

A. Perform the Work of this section by workers skilled in the demolition of buildings and structures. Perform the Work of this section under direct superintendence at all times.

B. Prior to commencement of Work, schedule a walkthrough with the OAR, to confirm Owner property items have been removed from scheduled Work areas. Identify and mark remaining property items and schedule their removal.

C. Coordinate demolition for the correct sequence, limits, and methods. Schedule demolition Work to create least possible inconvenience to the public and facility operations.

D. Related Standard: ANSI/ASSE A10.6.

1.04 PROJECT CONDITIONS

A. Drawings may not indicate in detail all demolition Work to be performed. Examine existing conditions to determine the full extent of required demolition.

B. Repair damage to existing improvements or damage due to excessive demolition.

C. Provide all measures to avoid excessive damage from inadequate or improper means and methods, improper shoring, bracing or support.

D. If conditions are encountered that varies from those indicated, promptly notify the Architect for clarification before proceeding.

PART 2 - PRODUCTS

2.01 HANDLING OF MATERIALS

A. Items scheduled for salvage by the Owner shall be delivered to a location designated by the OAR. Items shall be cleaned, packaged and labeled for storage.

B. Items scheduled for reuse shall be stored on the Project site and protected from damage, theft and other deleterious conditions.

PART 3 - EXECUTION

3.01 GENERAL

A. Protection:

1. Do not commence demolition until safety partitions, barricades, warning signs and other forms of protection are installed.

2. Provide safeguards, including warning signs, lights and barricades, for protection of workers, occupants, and the public.

B. If safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify the OAR.

3.02 DEMOLITION

A. Do not throw or drop materials. Furnish ramps or chutes as required by the Work.

B. Remove existing construction only to extent necessary for proper installation of Work and interfacing with existing construction. Cut back finished surfaces to straight, plumb or level lines as required for a smooth transition.

C. Where openings are cut oversize or in improper locations, replace or repair to required condition.

3.03 CUTTING EXISTING CONCRETE

A. Cutting of existing concrete shall be performed by skilled workers familiar with the requirements and space necessary for placing concrete. Perform concrete cutting with concrete cutting wheels and hand chisels. Do not damage concrete intended to remain.

B. Extent of cutting of structural concrete shall be as indicated on Drawings. Cutting of non-structural concrete shall be as indicated on Drawings or as reviewed by the Architect or structural engineer. Replace concrete demolished in excess of amounts indicated.

C. Prior to cutting or coring concrete, determine locations of hidden utilities or other existing improvements and provide necessary measures to protect them from damage.

3.04 REMOVAL OF EXISTING PLUMBING AND ELECTRICAL EQUIPMENT AND SERVICES

A. Remove existing plumbing and electrical equipment fixtures and services not indicated for reuse and not necessary for completion of the Work. Remove abandoned lines and cap unused portions of existing lines.

3.05 REMOVAL OF OTHER MATERIALS

A. Masonry: Cut back to joint lines and remove mortar without damaging units to remain. Allow space for repairs to backing where applicable.

B. Woodwork: Cut or remove to a joint or panel line.

C. Roofing: Remove as required, including accessory components such as insulation and flashings. At penetrations through existing roofing, trim cut edges back to sound roofing with openings restricted to the minimum size necessary to receive Work.

D. Sheet Metal: Remove back to joint, lap, or connection. Secure loose and unfastened ends or edges and provide a watertight condition. Re-seal as required.

E. Glass: Remove broken or damaged glass and clean rebates and stops of glazing channels.

F. Modular materials such as acoustical ceiling panels, resilient tile, or ceramic tile: Remove to a natural joint without leaving damaged or defective Work where joining new Work. After flooring removal, clean substrates to remove setting materials and adhesives.

G. Gypsum Board: Remove to a panel joint line on a stud or support line.

H. Plaster: Saw cut plaster on straight lines, leaving a minimum 2-inch width of firmly attached metal lath for installing new lath and plaster.

I. Remove existing improvements not specifically indicated or required but necessary to perform Work. Cut to clean lines, allowing for installation of Work.

3.06 PATCHING

A. Patch or repair materials to remain when damaged by the performance of the Work of this section. Finish material and appearance of patch and/or repair Work shall match existing.

3.07 CLEANING

A. Clean existing materials to remain with appropriate tools and equipment.

B. Protect existing improvements during cleaning operations.

C. Debris shall be dampened by fog water spray prior to transporting by truck.

D. Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.

E. Remove waste and debris, other than items to be salvaged. Turn over salvaged items to Owner, or store and protect for reuse where required. Continuously clean up and remove items as demolition Work progresses.

F. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 02 4117

DEMOLITION (GENERAL)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Furnishing labor, materials and equipment necessary for demolition, dismantling, cutting and alterations as indicated, specified, or required for completion of the Work. Includes items such as the following:

1. Protection of existing improvements to remain.

2. Cleaning existing improvements to remain.

3. Disconnecting and capping utilities.

4. Removing debris, waste materials, and equipment.

5. Removal of items for performance of the Work.

6. Salvageable items to be retained by the Owner.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 01 1100 - Summary of Work.

3. Section 01 5000 - Construction Facilities and Temporary Controls.

4. Section 01 7329 - Cutting and Patching.

5. Section 01 7419 - Construction and Demolition Waste Management.

6. Division 22 –- Plumbing.

7. Division 26 –- Electrical.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating the extent of items and systems to be removed. Indicate items to be salvaged or items to be protected during demolition. Indicate locations of utility terminations and the extent of abandoned lines to be removed. Include details indicating methods and location of utility terminations.

1.03 QUALITY ASSURANCE

A. Perform the Work of this section by workers skilled in the demolition of buildings and structures. Perform the Work of this section under direct superintendence at all times.

B. Prior to commencement of Work, schedule a walkthrough with the OAR, to confirm Owner property items have been removed from scheduled Work areas. Identify and mark remaining property items and schedule their removal.

C. Coordinate demolition for the correct sequence, limits, and methods. Schedule demolition Work to create least possible inconvenience to the public and facility operations.

D. Related Standard: ANSI/ASSE A10.6.

1.04 PROJECT CONDITIONS

A. Drawings may not indicate in detail all demolition Work to be performed. Examine existing conditions to determine the full extent of required demolition.

B. Repair damage to existing improvements or damage due to excessive demolition.

C. Provide all measures to avoid excessive damage from inadequate or improper means and methods, improper shoring, bracing or support.

D. If conditions are encountered that varies from those indicated, promptly notify the Architect for clarification before proceeding.

PART 2 - PRODUCTS

2.01 HANDLING OF MATERIALS

A. Items scheduled for salvage by the Owner shall be delivered to a location designated by the OAR. Items shall be cleaned, packaged and labeled for storage.

B. Items scheduled for reuse shall be stored on the Project site and protected from damage, theft and other deleterious conditions.

PART 3 - EXECUTION

3.01 GENERAL

A. Protection:

1. Do not commence demolition until safety partitions, barricades, warning signs and other forms of protection are installed. Refer to Section 01 5000 - Construction Facilities and Temporary Controls.

2. Provide safeguards, including warning signs, lights and barricades, for protection of workers, occupants, and the public.

B. If safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify the OAR.

3.02 DEMOLITION

A. Do not throw or drop materials. Furnish ramps or chutes as required by the Work.

B. Remove existing construction only to extent necessary for proper installation of Work and interfacing with existing construction. Cut back finished surfaces to straight, plumb or level lines as required for a smooth transition.

C. Where openings are cut oversize or in improper locations, replace or repair to required condition.

3.03 CUTTING EXISTING CONCRETE

A. Cutting of existing concrete shall be performed by skilled workers familiar with the requirements and space necessary for placing concrete. Perform concrete cutting with concrete cutting wheels and hand chisels. Do not damage concrete intended to remain.

B. Extent of cutting of structural concrete shall be as indicated on Drawings. Cutting of non-structural concrete shall be as indicated on Drawings or as reviewed by the Architect or structural engineer. Replace concrete demolished in excess of amounts indicated.

C. Prior to cutting or coring concrete, determine locations of hidden utilities or other existing improvements and provide necessary measures to protect them from damage.

3.04 REMOVAL OF EXISTING PLUMBING AND ELECTRICAL EQUIPMENT AND SERVICES

A. Remove existing plumbing and electrical equipment fixtures and services not indicated for reuse and not necessary for completion of the Work. Remove abandoned lines and cap unused portions of existing lines.

3.05 REMOVAL OF OTHER MATERIALS

A. Masonry: Cut back to joint lines and remove mortar without damaging units to remain. Allow space for repairs to backing where applicable.

B. Woodwork: Cut or remove to a joint or panel line.

C. Roofing: Remove as required, including accessory components such as insulation and flashings. At penetrations through existing roofing, trim cut edges back to sound roofing with openings restricted to the minimum size necessary to receive Work.

D. Sheet Metal: Remove back to joint, lap, or connection. Secure loose and unfastened ends or edges and provide a watertight condition. Re-seal as required.

E. Glass: Remove broken or damaged glass and clean rebates and stops of glazing channels.

F. Modular materials such as acoustical ceiling panels, resilient tile, or ceramic tile: Remove to a natural joint without leaving damaged or defective Work where joining new Work. After flooring removal, clean substrates to remove setting materials and adhesives.

G. Gypsum Board: Remove to a panel joint line on a stud or support line.

H. Plaster: Saw cut plaster on straight lines, leaving a minimum 2-inch width of firmly attached metal lath for installing new lath and plaster.

I. Remove existing improvements not specifically indicated or required but necessary to perform Work. Cut to clean lines, allowing for installation of Work.

3.06 PATCHING

A. Patch or repair materials to remain when damaged by the performance of the Work of this section. Finish material and appearance of patch and/or repair Work shall match existing.

3.07 CLEANING

A. Clean existing materials to remain with appropriate tools and equipment.

B. Protect existing improvements during cleaning operations.

C. Debris shall be dampened by fog water spray prior to transporting by truck.

D. Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.

E. Remove waste and debris, other than items to be salvaged. Turn over salvaged items to Owner, or store and protect for reuse where required. Continuously clean up and remove items as demolition Work progresses.

F. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 03 1000

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Formwork for cast-in-place concrete as indicated.

2. Installation of items to be embedded in concrete, such as anchor bolts, inserts, embeds, and sleeves.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 03 2000: Concrete Reinforcing.

3. Section 03 3000: Cast-In-Place Concrete.

1.02 REFERENCES

A. American Concrete Institute (ACI) Publication:

1. ACI 318 – Building Code Requirements for Structural Concrete, Chapter 6, Formwork, Embedded Pipes, and Construction Joints.

2. ACI 347 – Guide to Formwork for Concrete.

B. American Plywood Association (APA):

1. Form No. V345 - Concrete Forming Design/Construction Guide.

C. National Institute of Standards and Technology (NIST):

1. NIST Voluntary Product Standard PS 1.

1.03 SUBMITTALS

A. Submit detailed structural calculations and drawings approved and signed by a California registered Civil Engineer where the height of the falsework or vertical shoring, as measured from the top of the sills to the soffit of the superstructure exceeds 14 feet, or where individual horizontal span lengths exceed 16 feet, or where provision for vehicular traffic through falsework or shoring occurs. For all other falsework and shoring submit layout signed by California registered Civil Engineer, manufacturer's authorized representative or a licensed contractor experienced in the usage and erection of falsework and vertical shoring. A copy of the plans and calculation shall be available at the jobsite at all times.

B. Shop Drawings: Submit Shop Drawings indicating locations of forms, construction and expansion joints, embedded items, and accessories.

C. Product Data: Submit manufacturer's Product Data for form materials and accessories.

1.04 REGULATORY REQUIREMENTS

A. California Building Code (CBC), Chapter 19A.

B. California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 4, Construction Safety Orders, Article 6, Excavations, Sections 1713 and 1717.

1.05 DELIVERY, STORAGE AND HANDLING

A. Storage shall prevent damage and permit access to materials for inspection and identification.

PART 2 - PRODUCTS

2.01 GENERAL

A. Form materials may be reused during progress of the Work provided they are completely cleaned and reconditioned, recoated for each use, capable of producing formwork of required quality, and are structurally sound.

B. Form Lumber: WCLIB Construction Grade or Better, WWPA No. 1 or Better.

C. Plywood: NIST Voluntary Product Standard PS 1, Group 1, Exterior Grade B-B Plyform or better, minimum 5-ply and 3/4 inch thick for exposed locations and at least 5/8 inch thick for unexposed locations, grade marked, not mill oiled. Furnished plywood with medium or high density overlay is permitted.

D. Coated Form Plywood: For exposed painted concrete, plastic overlaid plywood of grade specified above, factory coated with a form coating and release agent Nox-crete", or equal.

E. Tube Forms: Sonoco "Seamless Sonotubes," Ceme-Tube, Quik-Tube, or equal, of the type leaving no marks in concrete, one-piece lengths for required heights.

F. Joist Forms: Code recognized steel or molded plastic types as required.

G. Special Forms: For exposed integrally-colored concrete, plywood as above with high density overlay, plywood with integral structural hardboard facing or fibrous glass reinforced plastic facing, providing specified finish.

H. For Exposed Concrete Finish:

1. Plywood: New, waterproof, synthetic resin bonded, exterior type Douglas fir or Southern pine plywood manufactured especially for concrete formwork and conforming to NIST Voluntary Product Standard PS 1, Grade B-B grade, Class I.

2. Glass-Fiber-Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surfaces.

3. Steel: Minimum 16 gage sheet, well matched, tight fitting, stiffened to support weight of concrete, without deflection detrimental to tolerances and appearances of finished concrete surfaces.

4. Plywood: "Finland Form,," "Combi Form" by North American Plywood Corporation, “Plyform” by Roy O. Martin, “ProForm” by Pacific Wood Laminates, or equal. The material shall be furnished with hard smooth birch face veneers with phenolic resin thermally fused onto panel sides. Edges shall be factory sealed.

I. Form Ties: Prefabricated rod, flat band, wire, internally threaded disconnecting type, not leaving metal within 1 1/2-inch of concrete surface.

J. Form Coating: Non-staining clear coating free from oil, silicone, wax, not grain-raising, "Formshield" by A.C. Horn, Inc., "Release" by Edoco/Dayton Superior, "Cast-Off" by Sonneborn/BASF Building Systems or equal. Where form liners are furnished, provide form coatings recommended by form liner manufacturer.

K. Form Liner: Rigid or resilient type by L.M. Scofield, Symons, Greenstreak, or equal.

L. Void Forms: Manufactured by SureVoid Products, Inc., Sonotube, Void Form International, or equal. Forms shall be "WallVoid" for temporary support of concrete walls and grade beams spanning between supports, and "SlabVoid" for creating gaps between concrete slabs or steps and underlying soils. Void forms shall be fabricated of corrugated paper with moisture resistant exterior, and shall be capable of withstanding working load of 1,500 psf. Provide accessories as required.

PART 3 - EXECUTION

3.01 GENERAL

A. Forms shall be constructed so as to shape final concrete structure conforming to shape, lines and dimensions of members required by Drawings and Specifications, and shall be sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together to maintain position and shape. Forms and their supports shall be designed so that previously placed structures will not be damaged.

B. Use form coating at all surfaces in contact with concrete.

3.02 TOLERANCES

A. Permitted abrupt or gradual irregularities in formed surfaces as measured within a 5 feet length with a straightedge shall per ACI 347, Table 3.1:

Class of Surface			
A	B	C	D
1/8 inch	1/4 inch	1/2 inch	1 inch

1. Class A: Use for concrete surfaces prominently exposed to public view.

2. Class B: Use for coarse-textured concrete-formed surfaces intended to receive plaster, stucco or wainscoting.

3. Class C: Use as a general standard for permanently exposed surfaces where other finishes are not specified.

4. Class D: Use for surfaces where roughness is not objectionable and will be permanently concealed.

3.03 ERECTION

A. Plywood shall be installed with horizontal joints level, vertical joints plumb and with joints tight. Back joints by studs or solid blocking, and fill where necessary for smoothness. Reused plywood shall be thoroughly cleaned, damaged edges or surfaces repaired and both sides and edges oiled with colorless form oil. Nail plywood along edges, and to intermediate supports, with common wire nails spaced as necessary to maintain alignment and prevent warping.

B. Openings for Cleaning: Provide temporary openings at points in formwork to facilitate cleaning and inspection. At base of walls and wide piers, bottom form board on one face for entire length shall be omitted until form has been cleaned and inspected.

C. Chamfers: Provide 3/4 inch by 3/4 inch chamfer strips for all exposed concrete corners and edges unless otherwise indicated.

D. Reglets and Rebates: As specified in Section 03 3000: Cast-In-Place Concrete.

3.04 REMOVAL OF FORMS

A. Forms shall not be removed until concrete has sufficiently hydrated to maintain its integrity and not be damaged by form removal operations. Unless noted otherwise and/or permitted by the Architect, columns and wall forms shall not be removed in less than five days, floor slabs in less than seven days, beams and girders in less than 15 days, pan forms for joists may be removed after three days, but joist centering shall not be removed until after 15 days, and ramp, landing, steps and floor slabs shall not be removed in less than seven days. Shoring

shall not be removed until member has acquired sufficient strength to support its weight, load upon it, and added load of construction.

B. Compressive strength of in-place concrete shall be determined by testing field-cured specimens representative of concrete location or members, as specified in Section 03 3000: Cast-In-Place Concrete.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.06 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 03 2000

CONCRETE REINFORCING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Concrete steel reinforcement.

B. Related Requirements:

1. Section 01 4523: Testing and Inspection

2. Section 03 1000: Concrete Forming.

3. Section 03 3000: Cast-In-Place Concrete.

1.02 REGULATORY REQUIREMENTS

A. Fabrication and placement of reinforcing shall be in accordance with the requirements of CBC, Chapter 19A.

1.03 REFERENCES

A. ASTM International:

1. ASTM A184 - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.

2. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

3. ASTM A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.

4. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

B. American Concrete Institute (ACI) Publication:

1. ACI SP-66 – ACI Detailing Manual.

2. ACI 318 – Building Code Requirements for Structural Concrete, as modified by CBC.

C. American Welding Society (AWS):

1. AWS D1.4 – Structural Welding Code – Reinforcing Steel.

D. The Masonry Institute

1. TMS 402/602-16 - Building Code Requirements and Specification for Masonry Structures

1.04 SUBMITTALS

A. Shop Drawings: Submit steel reinforcement Shop Drawings. Include assembly diagrams, schedule of reinforcement, bending charts and slab and framing plans. Indicate lengths and location of splices, size and lengths of reinforcing steel.

B. Closeout Submittals: Record exact locations of reinforcement that vary from Contract Documents.

1.05 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.

2. American Welding Society (AWS).

3. American Concrete Institute (ACI).

4. CBC, Chapter 19A, Concrete.

B. Source Quality Control: Refer to Division 01 Sections for general requirements and to the following paragraphs for specific procedures. Testing laboratory retained by the OWNER shall select test Samples of bars, ties, and stirrups from the material at the Project Site or from the place of distribution, with each Sample consisting of not less than two 18 inch long pieces, and perform the following tests according to ASTM A615, or ASTM A706, as applicable:

1. Identified Bars: If Samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill test reports, and properly tagged with the identification certificate so as to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of bars. Submit mill reports when Samples are selected.

2. Unidentified Bars: When positive identification of reinforcing bars cannot be performed and when random Samples are obtained; perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.

C. Certification of Welders: Shop and Project site welding shall be performed by welding operators certified by AWS.

1.06 DELIVERY, STORAGE AND HANDLING

A. Avoid exposure to dirt, moisture or conditions harmful to reinforcing.

B. Reinforcing steel bars, wire, and wire fabric shall be stored on the Project site to permit easy access for examination and identification of each shipment. Material of each shipment shall be separated for size and shape.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide reinforcing of sizes, gages and lengths indicated, bent to indicated shapes.

2.02 MATERIALS

A. Steel Reinforcing Bars:

1. ASTM A615, deformed grade 60 or 75 billet steel, as indicated on the drawings.

2. Weldable reinforcing bars shall conform to ASTM A706.

B. Bars or Rod Mats: ASTM A184.

C. Welded Wire Fabric for Reinforcement: ASTM A1064.

D. Tie Wire: ASTM A1064, fully annealed, copper-bearing steel wire, 16 gage minimum.

E. Chairs, Spacers, Supports, and Other Accessories: Standard manufacture conforming to ACI 315 fabricated from steel wire of required types and sizes. For reinforcement supported from grade, provide properly sized dense precast blocks of concrete.

2.03 FABRICATION OF REINFORCING BARS

A. Comply with CRSI Manual of Standard Practice for Reinforced Concrete Construction for fabrication of reinforcing steel.

B. Bending and Forming: Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcement for bending. Bend bars No. 6 size and larger in the shop only. Bars with unscheduled kinks or bends are not permitted. Provide only tested and permitted bar materials.

C. Welding: Provide only ASTM A706 steel where welding is indicated. Perform welding by the direct electric arc process in accordance with AWS D1.4 and specified low-hydrogen electrodes. Preheat 6 inches each side of joint. Protect joints from drafts during the cooling process; accelerated cooling is not permitted. Do not tack weld bars. Clean metal surfaces to be welded of loose scale and foreign material. Clean welds each time electrode is changed and chip burned edges before placing welds. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration into the base metal. Cut out welds or parts of welds deemed defective, using chisel, and replace with proper welding. Prequalification of welds shall be in accordance with CBC requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Bars shall be bent cold. Bars partially embedded in concrete shall not be field bent except as indicated on reviewed Shop Drawings.

B. Before installation and just prior to placing concrete, clean reinforcing of loose scale, rust, oil, dirt and any coating that could reduce bond.

C. Accurately position, install, and secure reinforcing to prevent displacement during the placement of concrete.

D. Provide metal chairs to hold reinforcement the required distance above form bottoms. In beams and slab construction, provide chairs under top slab reinforcement as well as under bottom reinforcement. Space chairs so that reinforcement will not be displaced during installation. Provide metal spacers to secure proper spacing. Stirrups shall be accurately and securely wired to bars at both top and bottom. At slabs, footings, and beams in contact with earth, provide concrete blocks to support reinforcement at required distance above grade.

E. Install and secure reinforcement to maintain required clearance between parallel bars and between bars and forms. Lapped splices shall be installed wherever possible in a manner to provide required clearance between sets of bars. Stagger lapped splices. Dowels and bars extending through construction joints shall be secured in position against displacement before concrete is installed and subsequently cleaned of concrete encrustations while they are still soft.

F. Do not install reinforcing in supported slabs and beams until walls and columns have been installed to underside of slabs and beams or until construction joints have been thoroughly cleaned. Reinforcing shall be inspected before placement of concrete and cleaned as required.

G. Use deformed bars unless otherwise indicated, except for spiral reinforcement.

3.02 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 03 3000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cast-in-place normal weight and lightweight concrete, placement and finishing.

B. Related Requirements:

1. Section 01 4523: Testing and Inspection

2. Section 03 1000: Concrete Forming and Accessories.

3. Section 03 2000: Concrete Reinforcing.

4. Section 32 1313: Site Concrete Work.

1.02 REFERENCES

A. American Concrete Institute (ACI) Publication:

1. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.

2. ACI 301 – Specifications for Structural Concrete.

3. ACI 302.1R – Guide for Concrete Floor and Slab Construction.

4. ACI 305R - Specification for Hot Weather Concreting.

5. ACI 306.1 – Standard Specification for Cold Weather Concreting.

6. ACI 308R – Guide to External Curing of Concrete.

7. ACI 318 - Building Code Requirements for Structural Concrete, as modified by CBC Sections 1901A,1903A, 1905A and 1910A.

B. American Society for Testing and Materials (ASTM) Standards:

1. ASTM C31 – Standard Specification for Making and Curing Concrete Test Specimens in the Field.

2. ASTM C33 - Standard Specification for Concrete Aggregates.

3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

4. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

5. ASTM C88 - Standard Test Method for Soundness of Aggregates by use of Sodium Sulphate or Magnesium Sulphate.

6. ASTM C94 - Standard Specification for Ready-Mixed Concrete.

7. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.

8. ASTM C150 - Standard Specification for Portland Cement.

9. ASTM C156 – Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid membrane-Forming Curing Compounds for Concrete.

10. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

11. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.

12. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

13. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.

14. ASTM C289 - Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).

15. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

16. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.

17. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.

18. ASTM C567 - Standard Test Method for Determining Density of Structural Lightweight Concrete.

19. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

20. ASTM C845 - Standard Specification for Expansive Hydraulic Cement

21. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.

22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

23. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.

24. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.

25. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

26. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.

27. ASTM C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).

28. ASTM D1751 - Standard Test Method for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

29. ASTM D7234 – Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.

30. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

31. ASTM E1155 - Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.

32. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.

33. ASTM E1745 - Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

34. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

35. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

36. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.

37. ASTM F3010 – Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use under Resilient Floor Coverings.

1.03 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating locations of cast-in-place concrete Work and accessory items such as vapor barriers. Include details and locations of reinforcing, embedded items, and interfacing with other Work.

B. Mix Design Data: Submit concrete mix designs as specified herein and in Article 2.02.

1. Submit name, address and telephone number of the concrete production facility which the contractor intends to engage to design the concrete mixes. Submit name and qualifications of the proposed concrete technologist.

2. Mix Design: Submit a concrete mix design for each strength and type of concrete indicated in the drawings or specified. Include water/cement ratio, source, size and amount of coarse aggregate and admixtures. Predict minimum compressive strength, maximum slump and air content percentage. Clearly indicate locations where each mix design will be used.

a. Water/cement ration for concrete slabs on grade shall be 0.50 maximum.

3. Test Reports: Submit copies of test reports showing that the proposed mixes produce concrete with the strengths and properties specified. Include tests for cement, aggregates and admixtures. Provide gradation analysis.

C. Material Samples: Submit Samples illustrating concrete finishes and hardeners, minimum 12-inch by 12-inch.

D. Certificates: Submit certification that each of the following conforms to the standards indicated:

1. Portland cement: ASTM C150.

2. Normal weight concrete aggregates: ASTM C33.

3. Lightweight concrete aggregates: ASTM C330.

4. Aggregates: Submit evidence that the aggregate is not reactive in the presence of cement alkalis. In the absence of evidence, aggregate shall be tested by one of the methods in ASTM C33 Appendix XI, Methods for Evaluating Potential for Deleterious Expansion Due to Alkali Reactivity of an Aggregate. Aggregates deemed to be deleterious or potentially deleterious may be used with the addition of a material that has been shown to prevent harmful expansion in accordance with Appendix XI of ASTM C33, when approved by the building official, in accordance to CBC Section 1903A5A.

5. Curing materials: ASTM C171.

E. Admixtures: Submit product data for proposed concrete admixtures.

1.04 QUALITY ASSURANCE

A. Continuous inspection shall be provided at the batch plant and for transit-mixed concrete to run check sieve analysis of aggregate, check moisture content of fine aggregate, check design of mix, check cement being used with test reports, check loading of mixer trucks, and certify to quantities of materials placed in each mixer truck.

B. Inspection shall be performed by a representative of a testing laboratory selected by the OWNER. OWNER will pay for inspection costs. Notify the laboratory 24 hours in advance of time concrete is to be mixed. Notify the laboratory of postponement or cancellation of mixing within at least 24 hours of scheduling time.

C. CONTRACTOR shall assist the testing laboratory in obtaining and handling samples at the project site and at the source of materials.

D. Continuous batch plant inspection requirement may be waived in accordance with CBC Section 1705A.3.3.1. Waiver shall be in writing, including DSA approval. When batch plant inspection is waived by DSA, the following requirements shall be met:

1. Approved inspector of the testing laboratory shall check the first batching at the start of work and furnish mix proportions to the licensed weightmaster.

2. Licensed weightmaster shall positively identify materials as to quantity and certify to each load by a ticket.

3. Tickets shall be transmitted to the Inspector by a truck driver with load identified thereon. The Inspector will not accept the load without a load ticket identifying the

mix and will keep a daily record of placements, identifying each truck, its load and time of receipt and approximate location of deposit in the structure and will transmit a copy of the daily record to DSA.

4. At the end of the project, the weightmaster shall furnish an affidavit to DSA certifying that all concrete furnished conforms in every particular to proportions established by mix designs.

E. Special Inspections and Tests shall be in accordance with CBC Chapter 17A, Reinforcement and Anchor testing per CBC Section 1910A.

1.05 DELIVERY, STORAGE AND HANDLING

A. Store cement and aggregate materials so as to prevent their deterioration or intrusion by foreign matter. Deteriorated or contaminated materials shall not be furnished.

B. Packaged materials shall bear the manufacturers and brand name label, and shall be stored in their original unbroken package in a weather tight place until ready for use in the work.

1.06 PROJECT CONDITIONS

A. Cold Weather Requirements: Batching, mixing, delivering and placing of concrete in cold weather shall comply with the applicable requirements of ACI 306.1.

B. Hot Weather Requirements: Batching, mixing, delivering and placing of concrete in hot weather shall comply with the applicable requirements of ACI 305R.

C. Concrete temperature of freshly mixed concrete shall be determined per ASTM C1064.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement: ASTM C150. Portland Cement.

B. Aggregates: Conform to the following standards:

1. Normal weight concrete: ASTM C33.

2. Lightweight concrete: ASTM C330, with fine aggregates per ASTM C33.

3. Aggregate shall be tested for Potential Alkali Reactivity of Cement-Aggregate Combinations per ASTM C289.

4. Nominal maximum size of coarse aggregate shall be no larger than:

a. 1/5 the narrowest dimension between sides of forms, nor

b. 1/3 the depth of slabs, nor

c. 3/4 the clear spacing between individual reinforcing bars or wires, bundles of bars, individual tendons, or ducts.

d. CONTRACTOR may request the ARCHITECT and DSA waiver of the above limitations reported per ACI 318, provided that the workability and methods of consolidation are such that the concrete can be placed without honeycombs or voids.

C. Water: Water for concrete mixes, curing and cleaning shall be potable and free from deleterious matter.

D. Admixtures: Shall be shown capable of maintaining essentially the same composition and performance throughout the work as the product used in establishing concrete proportions in accordance with ACI 318, Section 3.6.

1. Admixtures containing chlorides or sulfides are not permitted.

2. Air-entraining admixtures shall comply with ASTM C260. Air-entrained admixtures shall not be used for floor slabs to receive steel trowel finish.

3. Admixtures for water reduction and setting time modification shall conform to ASTM C494.

4. Admixtures for producing flowing concrete shall conform to ASTM C1017.

5. Admixtures containing ASTM C845 expansive cements shall be compatible with the cement and produce no deleterious effects.

6. Silica fumes used as an admixture shall conform to ASTM C1240.

E. Reinforcement Fibers: Chop strands of alkali-resistant polypropylene or nylon fibers added to the concrete mix for protection against shrinkage cracks.

F. Expansion Joint Fillers: Preformed strips, non-extruding and resilient bituminous type, of thickness indicated, conforming to ASTM D1751.

G. Curing:

1. Curing Paper: Shall conform to ASTM C171 and consist of two sheets of kraft paper cemented together with a bituminous material in which are embedded cords or strands of fiber running in both directions. The paper shall be light in color, shall be free of visible defects, with uniform appearance.

2. Elevated slabs and slabs on grade may be cured at CONTRACTOR's option with curing and proactive water vapor emission and alkalinity control system. Products shall be approved by OWNER's Office of Environmental Health and Safety.

a. VaporSeal 309, by Floor Seal Technology, Inc., or equal.

1) ASTM C156: 0.39 kg/m^2.

2) ASTM C309: Exceeds requirements.

3) ASTM C1315: Exceeds requirements.

4) ACI 308R-01 Compliant.

b. Remedial Treatment: Water vapor emission and alkalinity control treatment, MES 100 by Floor Seal Technology, Inc. or equal.

1) ASTM E96: <0.1 Perms.

2) ASTM D1308: 14pH Resistant.

3) ASTM D7234: 500+psi 100% concrete failure.

4) ASTM F2170: 100%RH resistant.

5) VOC Content: <100 g/L, meets SCAQMD Rule #1113.

6) ASTM F3010: Meets Requirements.

c. Self-leveling Compounds: Ardex Engineered Cements, K15, or V1200, Schonox ZM Rapid, US Self Leveler Armstrong, S-194, or equal.

H. Floor Hardener: Water soluble, inorganic, silicate-based curing, hardening, sealing and dustproofing compound. Aquaseal W20 by Monopole Inc., Kure-N-Harden by BASF, Chem Hard by L&M, Liqui-Hard by W. R. Meadows, or equal.

I. Underlayment: Two component latex underlayment for filling low spots in concrete for both interior and exterior applications, from featheredge to a maximum of 3/8 inch in thickness. Underlayment shall be non-shrink and suitable for repairing exposed concrete surfaces and for underlayment of carpet, resilient, tile and quarry floor coverings. La-O-Tex by TexRite, Underlay C, RS by Mer-Krete Systems, Underlayment 962 by C-Cure, or equal.

J. Stair Treads and Nosings: Two part stair tread and nosing with ribbed abrasive bars. Fabricated from 6063-T5 or 6063-T6 extruded aluminum, mill finish. Anti-slip abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Color shall extend uniformly throughout filler.

1. American Safety Tread: TP-311R.

2. Balco Inc.: DST-330.

3. Nystrom: STTB-P3.375E.

4. Wooster Products Inc.: WP-RN3SG.

5. Equal.

K. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 7 days; of consistency suitable for application and a 30 minute working time.

2.02 CONCRETE MIX

A. Mix shall be signed and sealed by a Civil or Structural Engineer currently registered in the State of California.

B. Strength of Concrete: Strengths and types of concretes shall be as indicated in the Drawings. Unless otherwise indicated or specified, concrete shall be provided with minimum 28-day strength of 3000 psi (f'c).

C. Concrete mix shall meet the durability requirements of ACI 318, Chapter 19.

D. Concrete proportioning shall be determined on the basis of field experience and/or trial mixtures shall in accordance with ACI 301. Proportions of materials shall provide workability and consistency to permit concrete to be placed readily into forms and around reinforcement under conditions of placement to be employed, without segregation or excessive bleeding.

E. Ready-Mixed Concrete: Mix and deliver in accordance with requirements of ASTM C94.

PART 3 - EXECUTION

3.01 GENERAL

A. Surfaces to receive concrete shall be free of debris, standing water, and any other deleterious substances before start of concrete placing.

B. Time of Placing: Do not place concrete until reinforcement, conduits, outlet boxes, anchors, hangers, sleeves, bolts, and other embedded materials are securely fastened in place. Contact the Inspector at least 24 hours before placing concrete; do not place concrete until inspected by the Project Inspector.

C. Pouring Record: A record shall be kept on the Project site of time and date of placing concrete in each portion of structure. Such record shall be maintained on the Project site until Substantial Completion and shall be available for examination by the ARCHITECT and DSA.

3.02 TOLERANCES

A. Concrete construction tolerances shall be as specified in ACI 117 and as modified herein.

B. Floor Flatness (F_F) and Floor Levelness (F_L) shall be as indicated below:

	Specified Overall Value		Minimum Local Value	
	F_F	F_L	F_F	F_L
Slabs on ground: mechanical and electrical rooms, parking structures and mortar bed set tile and quarry flooring.	20	15	15	10
Slab on ground: carpet.	25	20	17	15
Slab on ground: thinset tile and resilient flooring.	35	25	24	17
Suspended slabs: mechanical and electrical rooms, parking structures and mortar bed set tile and quarry flooring.	20	15	N/A	N/A
Suspended slabs: carpet.	25	20	N/A	N/A
Suspended slabs: thinset tile and resilient flooring.	35	20	N/A	N/A

C. Refer to ACI 302.1R, Tables 8.1 and 8.2 Slab on Ground and Suspended Flatness/Levelness Construction Guide, for recommended concrete placing and finishing methods.

D. Floor Flatness and Floor Levelness shall be tested in accordance to ASTM E1155. Floor measurements shall be made within 48 hours after slab installation, and shall precede removal of shores and forms.

3.03 PREPARATION

A. Reglets and Rebates:

1. Form reglets and rebates in concrete to receive flashing, frames and other equipment as detailed and required. Coordinate dimensions and locations required with other related Work.

2. If concrete slabs on grade adjoin a wall or other perpendicular concrete surface, form a reglet in wall to receive and carry horizontal concrete Work. Reglet shall be full thickness of the slab and shall be 3/4 inch wide, unless otherwise indicated. Requirement does not apply to exterior walks, unless specifically indicated.

B. Screeds: Install screeds accurately and maintain at required grade or slab elevations after steel reinforcement has been installed, but before starting to place concrete. Install screeds adjacent to walls and in parallel rows not to exceed 8 feet on centers.

3.04 INSTALLATION

A. Conveying and Placing:

1. Concrete shall be placed only under direct observation of the Project Inspector. Do not place concrete outside of regular working hours, unless the Inspector has been notified at least 48 hours in advance.

2. Concrete shall be conveyed from mixer to location of final placement by methods that will prevent separation or loss of materials.

3. Concrete shall be placed as nearly as practicable to its final position to avoid segregation due to re-handling or flowing. No concrete that has partially hydrated or has been contaminated by foreign materials shall be placed, nor shall re-tempered concrete or concrete which has been remixed after initial set be placed.

4. In placing concrete in columns, walls or thin sections, provide openings in forms, elephant trunks, tremies or other recognized devices, to prevent segregation and accumulation of partially hydrated concrete on forms or metal reinforcement above level of concrete being placed. Such devices shall be installed so that concrete will be dropped vertically. Unconfined vertical drop of concrete from end of such devices to final placement surface shall not exceed 6 feet.

5. Concrete shall be placed as a continuous operation until placing of panel or section is completed. Top surfaces of vertically formed lifts shall be level.

6. Concrete shall be thoroughly consolidated by suitable means during placement, and shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms.

7. Where conditions make consolidation difficult or where reinforcement is congested, batches of mortar containing same proportions of cement, sand, and water as provided in the concrete, shall first be deposited in the forms to a depth of at least one inch.

B. Cold Weather:

1. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather. All ground with which concrete is to come in contact shall be free from frost. No frozen materials or materials containing ice shall be used.

2. The temperature of concrete at the time of placement shall not be below the minimum temperatures given in Table 3.1 of ACI 306.1.

3. Concrete shall be maintained at a temperature of at least 50° F. for not less than 72 hours after placing or until it has thoroughly hardened. Cover concrete and provide sufficient heat as required. When necessary, aggregates shall be heated before mixing. Special precautions shall be taken for protection of transit-mixed concrete.

C. Hot Weather:

1. Concrete to be placed during hot weather shall comply with the requirements of ACI 318, Section 26.5.

2. Maintain concrete temperatures indicated in Table 2.1.5 of ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square feet of exposed concrete per hour.

3. Cool concrete using methods indicated in ACI 305R Appendix B.

4. Place and cure concrete as specified in ACI 305R Chapter 4.

D. Compaction and Screeding:

1. Tamp freshly placed concrete with a heavy tamper until at least 3/8 inch of mortar is brought to surface. Concrete shall then be tamped with a light tamper and screeded with a heavy straightedge until depressions and irregularities are eliminated, and surface is true to finish grades or elevations. Remove excess water and debris.

2. Where slabs are to receive separate cement finish or mortar setting bed, continued tamping to raise mortar to surface is not performed. Laitance shall be removed by brushing with a stiff brush or by light sandblasting to expose clean top surface of coarse aggregate.

E. Floating and Troweling:

1. When concrete has hydrated sufficiently, it shall be floated to a compact and smooth surface. After floating, wait until concrete has reached proper consistency before troweling. Top surfaces shall receive at least 2 troweling operations with steel hand trowel. Prior to and during final troweling, apply a fine mist of water frequently with an atomizing type fog sprayer. Omit troweling for slabs to receive a separate cement finish.

2. For interior finish slabs, final troweling shall provide a hard, impervious, and non-slip surfaces, free from defects and blemishes. Finished surface shall be within

tolerances indicated in Article 3.02. Avoid burnishing. Do not add cement or sand to absorb excess moisture.

3. Vertical concrete surfaces shall be finished smooth and free from marks or other surface defects.

3.05 CURING

A. Length of time, temperature and moisture conditions for curing concrete shall be in accordance with ACI 318, Section 26.5.

B. Forms containing concrete, top of concrete between forms, and exposed concrete surfaces after removal of forms shall be maintained in a thoroughly wet condition for at least 7 consecutive days after placing.

C. If weather is hot or surface has dried out, spray surface of concrete slabs and paving with fine mist of water, starting not later than 2 hours after final troweling and continuing until sunset. Surface of finish shall be kept continuously wet until curing medium has been installed.

D. Immediately after finishing, monolithic floor slabs shall be covered with curing paper. Paper shall be lapped 4 inches at joints and sealed with waterproof sealer. Edges shall be cemented to finish. Repair or replace paper damaged during construction operations.

E. When curing slabs with proactive water vapor emission and alkalinity control system:

1. Coordinate and schedule application of curing compound with concrete pour schedule, while conforming to manufacturer's application instructions.

2. When the surface of the concrete has hardened sufficiently to sustain foot traffic pre-cure slabs with liquefied product application following manufacturer's written instructions. Application shall be by trained applicators.

3. Monitor Environmental Conditions: Set up weather station 20 to 30 inches above freshly placed concrete. Record temperature, humidity and wind velocity measurements at 15 minute maximum intervals.

4. Calculate Evaporation Rate: Use recorded weather information in combination with nomograph per ACI 308R, Figure 4.1, Guide to Curing Concrete, to evaluate relevant evaporation rate.

5. When the bleed water rate of the concrete is approximately equal to the surface water evaporation rate, spray curing compound material throughout surface of slabs and decks, following manufacturer's written instructions. Application shall be by trained applicators.

6. Perform the following tests at least 28 days after placement of concrete and prior to floor covering installation. Submit to OAR test results indicating locations that do not comply with scheduled flooring installation requirements.

a. Calcium chloride testing per ASTM F1869.

b. Relative humidity testing per ASTM F2170.

c. Alkalinity testing per ASTM F710.

d. Perform concrete bond layer humidity meter testing to determine substrate surface acceptability.

7. Areas emitting moisture and alkalinity at rates exceeding floor covering manufacturer's published ASTM F1869 limits, shall receive a corrective coating, at no cost to the OWNER, as follows:

a) Mask and protect adjacent walls and floor surfaces from effects of scarification and application of remedial treatment.

b) Scarify slab surface in area of application by shot blasting or other method acceptable to corrective coating manufacturer.

c) Prepare and fill cracks, control joints and cold joints.

d) Apply two-component modified epoxy penetrant and coating with roller and squeegee over required treatment area; saturate surfaces to ensure a through mechanical bond.

e) Clean and fill divots, chips, voids and other surface irregularities with one hundred percent Portland cement based patching compound or cementitious fill.

f) Apply cementitious surfacing over coating in areas to receive resilient and wood floor coverings to facilitate adhesion; apply to a thickness of 1/8 inch.

3.06 FILLING, LEVELING AND PATCHING

A. Concrete slabs exhibiting high or low spots and indicated to receive resilient floor covering or soft floor covering, shall have surfaces repaired. High spots shall be honed, or ground with power-driven machines to required tolerances. Low spots shall be filled with latex underlayment, installed in strict accordance with manufacturer's written recommendations.

B. Holes resulting from form ties or sleeve nuts shall be solidly packed, through exterior walls, by pressure grouting with cement grout, as specified. Grouted holes on exposed surfaces shall be screeded flush and finished to match adjoining surfaces.

C. Cement Base: Cement base shall be of the height, thickness, and shape detailed. Base shall be reinforced with one inch mesh, 18 gage, zinc-coated wire fabric. Base finish mixture shall be one part Portland cement, 2 parts of fine aggregate and one part pea gravel. Colored cement base shall include a chemically inert mineral oxide pigment in the mix.

3.07 FINISHING

A. Soda and Acid Wash: Concrete surfaces to receive plaster, paint or other finish, and which have been formed by oil coated forms, shall be scrubbed with a solution of 1-1/2 pounds of caustic soda to one gallon of water. Surfaces where smooth wood or waste molds have been furnished shall be scrubbed with a solution of 20 percent muriatic acid. Wash with clean water after scrubbing.

B. Sacking: Exposed concrete curbs, walls, and other surfaces shall be sacked by an application of Portland cement grout, floated, and rubbed. Sacking shall not be performed until patching and filling of holes has been completed. Entire sacking operation for any continuous area shall be started and completed within the same day.

1. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having consistency of thick paint. Wet surface of concrete sufficiently to prevent absorption of water from grout. Apply grout uniformly with a brush or spray gun, then immediately float surface with a cork or other suitable float, scouring wall vigorously.

2. While grout is still plastic, finish surface with a sponge-rubber float, removing excess grout. Allow surface to dry thoroughly, then rub vigorously with dry burlap to completely remove dried grout. No visible film or grout shall remain after rubbing with burlap.

C. Sandblasting: Exterior concrete surfaces to receive stucco dash coat finish, where plywood or other smooth forms have been furnished, shall be uniformly sand-blasted with sharp quartz sand under sufficient air pressure to remove dirt, form oil and other foreign materials, and roughen surface to provide a proper bond. Such surfaces shall be thoroughly washed with clean water after sandblasting.

D. Abrasive: Concrete stair treads, landings, ramps and steps on interior and exterior of buildings, and interior exposed concrete floors in shop buildings shall receive an abrasive finish.

E. Floor Hardener: Exposed interior concrete floors throughout shall be treated with floor hardener.

1. Protect adjacent surfaces. Clean surfaces to receive treatment in accordance with manufacturer's instructions, ensuring that all stains, oil, grease, form release agents, laitance, dust and dirt are removed prior to application.

2. Apply hardener in accordance with manufacturer’s instructions as soon as concrete is firm enough to work on after final troweling.

F. Cement Grout and Dry-Pack Concrete: Cement grout shall be mixed at the Project site and shall be composed of one volume of Portland cement and 2-1/2 volumes of fine aggregate. Materials shall be mixed dry with sufficient water added to make mixture flow under its own weight. When grout is used as a dry pack concrete, add sufficient water to provide a stiff mixture, which can be molded into a sphere.

G. Broom Finish: Exterior stair treads and landings shall be provided with a non-slip broom finish in addition to abrasive finish specified.

H. Abrasive Stair Nosing: Nosing shall be installed according to manufacturers written recommendations and in accordance with the details as provided in the drawings.

3.08 EXPANSION AND CONSTRUCTION JOINTS

A. Construction Joints: Details and proposed location of construction joints shall be as indicated on the Drawings, located to least impair strength of structure, in accordance with the following:

1. Thoroughly clean contact surface by sand blasting entire surface not earlier than 5 days after initial placement.

2. A mix containing same proportion of sand and cement provided in concrete plus a maximum of 50 percent of coarse aggregate shall be placed to a depth of at least one inch on horizontal joints. Vertical joints shall be wetted and coated with a neat cement grout immediately before placing of new concrete.

3. Should contact surface become coated with earth, sawdust, or deleterious material of any kind after being cleaned, entire surface shall be re-cleaned before applying mix.

B. Expansion Joints: Provide expansion joints where indicated in walks and exterior slabs. Space approximately 20 feet apart, unless otherwise indicated. Joints shall extend entirely through slab with joint filler in one piece for width of walk or slab. Joint filler shall be 3/8 inch thick, unless otherwise indicated.

C. Tooled Joints: Slabs, walks and paving shall be marked into areas as indicated with markings made with a V-grooving tool. Marks shall be round-edged, free from burrs or obstructions, with clean cut angles and shall be straight and true. Walks, if not indicated, shall be marked off into rectangles of not more than 12 square feet and shall have a center marking where more than 5 feet wide.

3.09 TESTING

A. Molded Cylinder Tests:

1. Inspector or testing lab personnel will prepare cylinders and perform slump tests. Samples for concrete strength shall be taken in accordance to ASTM C172. Each cylinder shall be dated, given a number, point in structure from which sample was obtained, mix design number, mix design strength and result of accompanying slump test noted.

2. Separate tests of molded concrete cylinders obtained at same place and time shall be made at age of three days, seven days, and 28 days. A strength test shall be the average of the compressive strength of two cylinders, obtained from the same sample of concrete and tested at 28 days or at test age designated for determination of f'c.

3. Test cylinders shall be prepared at the Project site and stored in testing laboratory in accordance with ASTM C31, and tested in accordance with ASTM C39.

B. Core Test: At request of the ARCHITECT, cores of hardened concrete shall be cut from portions of hydrated structures for testing, in accordance with CBC and ASTM C42.

1. Provide 4 inch diameter cores at representative places throughout the structure as designated by the ARCHITECT.

2. In general, provide sufficient cores to represent concrete placed with at least one core for each 4,000 square feet of building area, and at least 3 cores total for each Project.

3. Where cores have been removed, fill voids with drypack, and patch the finish to match the adjacent existing surfaces.

C. Concrete Consistency: Measure consistency according to ASTM C143. Test twice each day or partial day's run of the mixer.

D. Adjustment of Mix: If the strength of any grade of concrete for any portion of Work, as indicated by molded test cylinders, falls below minimum 28 days compressive strength specified or indicated, adjust mix design for remaining portion of construction so that resulting concrete meets minimum strength requirements.

E. Air Content Testing: Measure in accordance to ASTM C173 or ASTM C231, for each composite sample taken in accordance to ASTM C172.

F. Defective Concrete:

1. Should strength of any grade of concrete, for any portion of Work indicated by tests of molded cylinders and core tests, fall below minimum 28 days strength specified or indicated, concrete will be deemed defective work and shall be replaced or adequately strengthened in a manner acceptable to the ARCHITECT and DSA.

2. Concrete Work that is not formed as indicated, is not true within 1/250 of span, not true to intended alignment, not plumb or level where so intended, not true to intended grades and levels, contains sawdust shavings, wood or embedded debris, or does not fully conform to Contract provisions, shall be deemed to be defective Work and shall be removed and replaced.

G. Concrete for Equipment Pads, Mechanical and Electrical Work: Unless otherwise indicated, strength shall have a minimum $f'c$ = 3,000 psi. Exposed concrete shall be provided with a hand trowel finish with radius corners and edges. Form and place concrete where necessary as described in Section 03 1000 Concrete Forming and Accessories, and reinforced as described in Section 03 2000 Concrete Reinforcing. Calcium chloride shall not be furnished in any concrete mix provided for the installation of underground electrical conduits. For concrete encasement of more than one conduit, furnish 3/4 inch maximum aggregate.

3.10 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.11 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 03 3543

POLISHED CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. This is the recommended specification for ULTRAFLOR ® DIAMATIC® Polished Concrete System.

B. Complete installation details are provided in the DIAMATIC ® Technical Brochures available at www.diamaticusa.com.

C. Related Requirements:

1. Division 01 - General Requirements.

2. Section 32 1313: Site Concrete Work.

3. Section 03 1000: Concrete Forming and Accessories.

4. Section 03 2000: Concrete Reinforcing.

5. Section 03 3000: Cast-In-Place Concrete

6. Section 07 2600: Vapor Barriers.

1.02 SECTION INCLUDES

A. Products and procedures for the installation of the ULTRAFLOR® DIAMATIC® Polished Concrete System using a multi-step dry mechanical process and accessories indicated, specified or required to complete system and achieve specified finish:

1. DIAMATIC® Mechanical Diamond Grinding and Polishing Equipment ACI 301 – Specifications for Structural Concrete.

2. ULTRAFLOR® DIAMATIC® Concrete Treatment Chemicals ACI 305R - Specification for Hot Weather Concreting.

B. Products and procedures for the initial and long term maintenance of the ULTRAFLOR® DIAMATIC® Polished Concrete System.ASTM C31 – Standard Specification for Making and Curing Concrete Test Specimens in the Field.

1.03 SUBMITTALS

A. Product Data: Submit Manufacturer’s technical literature for each product indicated, specified or required. Include manufacturer’s technical data, application instructions, recommendations and MSDS.

B. Installer Qualifications: Data for company, principal personnel, experience, and training. Provide a letter documenting installer’s accreditation and certification compliance, as specified under quality assurance.

C. Maintenance Data: Provide manufacturer's instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under intended use. These instructions should contain precautions against cleaning products and methods, which may be detrimental to finishes and performance.

1.04 QUALITY ASSURANCE / WARRANTY

A. Manufacturer Qualifications: The ULTRAFLOR® DIAMATIC® Polished Concrete System consists of a process and products engineered and manufactured by DIAMATIC. Any substitutions are not permitted and void warranty.

B. Installer Qualifications:

1. Installer must be an DIAMATIC® ELITE installer for the ULTRAFLOR® Polished Concrete System, including the use of DIAMATIC® equipment and diamond abrasives, and DIAMATIC® concrete preparation, and chemical hardening and finishing materials.

2. Installer must be experienced in performing specified work similar in design, products and scope of this project, with a documented track record of successful, in-service performance and with sufficient production capabilities, facilities and personnel to produce specified work.

3. A factory-trained, competent supervisor must be maintained on site during all times during which specified work is performed.

4. National brand specific projects must have DMS (Diamatic Management Services) personnel present during the pre-construction conference to insure quality control standards are in compliance.

5. Installer must provide written documentation from the manufacturer confirming the Installer's current accreditation and training from DIAMATIC on installation of the ULTRAFLOR® DIAMATIC® Polished Concrete System and related equipment and processes. Failure to provide current accreditation will void any warranty implied or otherwise associated with the ULTRAFLOR® System.

6. A current list of qualified installers may be obtained through DIAMATIC MANAGEMENT SERVICES, DIAMATIC® USA 866-295-5512

C. Mock-Up: Before performing the work in this section, an adequate on-site mock-up of the ULTRAFLOR® DIAMATIC® Polished Concrete System representative of specified process, surface, finish, color and joint design/treatments must be installed for review and approval. These mock-ups should be installed using the same Installer personnel who will perform work. Approved mock-ups may become part of completed work, if undisturbed at time of substantial completion.

D. Static Coefficient of Friction: A reading of not less than 0.5 for level floor surfaces shall be achieved and documented, as determined by certified an NFSI walkway auditor using the ANSI B-101 quality control test.

E. Test Reports: Comply with the provisions of the following specifications and standards, except as otherwise noted or specified, or as accepted or directed by the Owner and/or Architect. All test data shall be recorded and submitted upon completion of job.

1. Section 03 30 00, Cast-In-Place Concrete

2. ASTM E1155, Standard Test Method for Determining Floor Flatness and Levelness using the F number system

3. ASTM D-523, Standard Test Method for Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry

4. ACI 302 1 R-04 Guide for Concrete Floor and Slab Construction

F. Pre-Installation Conference: Prior to the installation of the ULTRAFLOR® DIAMATIC® Polished Concrete System, an on-site conference shall be conducted to review specification requirements.

1. Required attendees include the Owner, Architect, General Contractor, ULTRAFLOR® DIAMATIC Polished Concrete System Subcontractor, and DMS representative as required in 1.04-B section d, Quality Assurance.

2. The minimum agenda shall include:

a. Tour of work area, inspection and discussion of preparation of substrate and other pre-Installation conditions and issues.

b. Review of System requirements, including drawings, specifications and other contract documents.

c. Review of required submittals and completion status.

d. Review and finalization of installation schedule, and verification of availability of required materials, trained Installer personnel, equipment and facilities to execute specification and avoid delays.

e. Limit access to work area by other trades to reduce possible damage to the floor before, during and after completion.

f. Review of required inspection, testing, certification and material usage accounting procedures.

g. Review of power requirements and responsibility.

h. Review of governing regulations and requirements for insurance, certifications, inspection and testing, if applicable.

i. Review of temporary protection requirements during and after installation.

j. Review of cleaning procedures during and after installation.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original containers, bearing manufacturer’s labels indicating brand name and directions for storage, factory numbered and sealed until ready for installation.

B. Maintain copies of all chemical MSDS, and Technical data sheets for all products.

C. Store all materials in a dry, climate-controlled environment at a minimum of 55°F (13°C) and maximum of 85°F (29°C).

1.06 PROJECT CONDITIONS

A. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting the floor finish.

B. Close areas to traffic during and after ULTRAFLOR® DIAMATIC® Polished Concrete System application for a time period recommended by DIAMATIC®

C. Inspect the existing substrate and document unsatisfactory conditions in writing. Verify that surfaces and site conditions are ready to receive work. Correct unacceptable conditions prior to installation of System. Commencement of work constitutes acceptance of substrate conditions.

D. Existing concrete must be cured for a sufficient time period as recommended by DIAMATIC® before the application can begin, typical 28 days.

E. Protect existing concrete and the new ULTRAFLOR® DIAMATIC® Polished Concrete System from contamination by petroleum, oil, hydraulic fluid, acid and acidic detergents, paint and other liquid dripping from trades and equipment working over these substrates. If construction equipment must be used on these substrates, diaper all components that may drip fluids.

F. Prohibit the placement and storage of construction materials over new ULTRAFLOR® DIAMATIC® Polished Concrete System, to include ferrous metals and steel members.

G. Prohibit vehicle parking and pipe cutting operations over concrete before and after the ULTRAFLOR® DIAMATIC® Polished Concrete System.

H. Moisture Vapor Testing

a. Test existing concrete for moisture vapor transmission according to methods indicated in ASTM F1869. Acceptable results: not more than 5 pounds per 1,000 square feet in 24 hours.

b. Test existing concrete for relative humidity using in situ probes according to ASTM F2170. Acceptable results: not more than 80%.

PART 2 - PRODUCTS

2.01 SYSTEM INTEGRITY

A. The ULTRAFLOR® DIAMATIC® Polished Concrete System is an engineered and integrated complete installation system requiring strict adherence to all specified installation processes, equipment, diamond abrasives, concrete preparation, joint treatment and chemicals to achieve the intended result. Any substitutions from the specified products and/or processes will void the system warranty.

2.02 MATERIALS

A. DIAMATIC® EQUIPMENT

1. DIAMATIC® BMG-780 or BMG-735: Planetary Grinder and Polisher, Large Platform: 32” planetary floor polisher. Head pressure of 600 lbs.

2. DIAMATIC® Micro Polisher MPS-1721-1727 - Burnisher: Specific weight and RPM are required to reach temperature of 100˚F for application of FLOR-FINISH application.

3. Vacuums: Dust Collection must be designed for filtering of concrete dust. Minimum air speed of 300 CFM for Large and Medium Platform equipment.

4. DIAMATIC® BDC3140P, 1330 BDP.

5. Power generator capable of supplying a minimum output of 45kw and above and capable of generating 480/240 Volt three phase power.

6. DIAMATIC® Diamond Abrasives and Blades

    a. Metal Bonded Diamonds – 30/40, 60/80, Grit of soft, medium and hard bonded metal. Note: Concrete has hardness levels of soft, medium and hard. The hardness of the concrete will determine the required hardness of the metal bonded diamonds:

        1. Hard Concrete: Soft metal bonded diamonds

        2. Medium Concrete: Medium metal bonded diamonds

        3. Soft Concrete: Hard metal bonded diamonds

7. Transitional Diamonds, - #0, #1, #2 Grit.

8. Hybrid Flex-res Resin Bonded Diamonds -50, 100, 200, 400, 800, 1500, 3000 Grit.

9. FLOR-GRIT Diamond Impregnated Pads – 200, 400, 800, 1500, 3000 Grit.

B. ULTRAFLOR® DIAMATIC® CONCRETE TREATMENT CHEMICALS

    a. DIAMATIC® FLOR-SIL™ Lithium Densifier for standard concrete and terrazzo surfaces

    b. DIAMATIC® FLOR-COLOR™ Micronized Water Borne High Performance Dye

    c. DIAMATIC® FLOR-FINISH Stain and Wear Protection Treatment (high-gloss) Powered by Dow Corning.

    d. DIAMATIC® FLOR-FINISH-L Stain and Wear Protection Treatment (low-gloss) Powered by Dow Corning

C. DIAMATIC® PROTECTION MATERIALS

10. To prevent minor damage from light trade traffic during build out of site, DIAMATIC PRIMO-COVER Protective Floor Covering or equal for the flooring shall be installed.

11. Any protective covering substitutions must be approved by DIAMATIC™ in advance of the system installation

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect all concrete substrates and conditions under which the ULTRAFLOR® DIAMATIC® Polished Concrete System to be installed.

B. Verify that all surfaces and site conditions are ready to receive work; document and correct conditions detrimental to timely and proper installation of work. Beginning work constitutes acceptance of substrate condition.

C. Verify that existing concrete has cured a minimum of 28 days and meets finish and surface profile requirements in Division 03 Section “Cast-In-Place Concrete,” before installing the ULTRAFLOR® DIAMATIC Polished Concrete System.

D. Inspect to mock-up panel to insure it is satisfactory and meets all of the owner’s requirements.

E. Conduct pre-installation conference, per Section 1.3 F

3.02 PREPARATION

A. DEMOLITION

1. Clear surfaces of any debris and construction materials.

2. If a generator is not provided by the Installer, power connections for the equipment of the ULTRAFLOR® DIAMATIC® Polished Concrete System shall be located and prepared by general contractor.

3. Using the appropriate mechanical means and methods, remove existing floor coverings and coatings, including but not limited to carpet VCT, ceramic tile and grout, wood, epoxy/ urethane, quartz, mastic, adhesives, paint or other non-concrete floor materials. Adhesives must be removed to their penetrated depth.

    a. Note: The mechanical removal of resilient flooring, backing, lining felt, cutback and other adhesives can be hazardous, as certain materials may contain asbestos or crystalline silica. Do not sand, dry sweep, dry scrape, drill, saw, bead blast, grind, mechanically chip or pulverize these materials, as harmful dust may result. Inhalation of this dust may cause asbestosis or other bodily harm. Please consult the adhesive manufacturer, the Resilient Floor Covering Institute (www.rfci.com) and all applicable government agencies for rules and regulations concerning the handling and removal asbestos-containing materials.

b. Prevent any damage to concrete slab surface during demolition from chipping hammers. Existing flooring should be removed mechanically with walk-behind or ride-on scraping equipment.

4. Prepare the existing concrete mechanically via scarification, shot blasting or other means, including diamond grinding by using aggressive, metal bonded DIAMATIC® Polycrystalline diamonds (18/20 Grit or 30/40 Grit), to remove all contaminants and provide a sound concrete surface free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil and other contaminants.

5. Chemical preparation of the substrate is NOT acceptable, including but not limited to acid etching, sweeping compounds, solvents and adhesive removers.

6. Suppress dust during demolition with the use of dust collection equipment to reduce or eliminate airborne concrete and substrate dust.

7. Where existing concrete is cracked, damaged, spalled, not within specified tolerance, or contains unacceptable levels of contaminates or moisture vapor, the Installer of the ULTRAFLOR® DIAMATIC® Polished Concrete System will evaluate conditions and proceed with appropriate ULTRAFLOR® System components.

B. Joint Fill (Indoor)

1. All joint fill materials shall be installed in accordance with the written recommendations provided in the approved manufacturer's technical data.

2. For the best results all joints should be filled after the first pass of metal bonded diamonds, but before any further grinding continues.

3. If the joint filling will occur after the polishing process, apply DIAMATIC® FLOR- SIL or, tape, or soap to the edge of the concrete to keep the joint filler from staining the concrete.

3.03 GLOSS ATTAINMENT (ASTM E430)

A. Gloss readings are not to be obtained through the use of any microfilming products, sealers, coatings, enhancers or as the result of resin transfer from resin bond abrasives.

B. Readings shall be taken not less than 10' (3 m) on center in field areas and within 1' (0.3 m) of floor area perimeters. In no case shall a reading be below 2% of specified minimum sheen

1. Level A Sheen – Low Gloss reading of 30 to 40. 400 grit diamond finish.

2. Level B Sheen – Medium Gloss reading of 41 to 55. 800 grit diamond finish.

3. Level C Sheen – High Gloss reading of 56 or higher. 1500 grit or higher.

C. For instructions on achieving gloss levels, refer to the appropriate sub-section of section 3.04 below.

3.04 POLISHING

Use the section below to determine specific finish details for the project. See the attached addendums for specific tooling and process requirements.

A. CUT LEVELS:

1. LEVEL 1 CUT / A light cut that removes the surface paste exposing the fine aggregates near the surface. Also referred to as a cream finish. Note that a Level 1 cut will require high F-numbers to achieve, Min FF 50.Concrete shall be conveyed from mixer to location of final placement by methods that will prevent separation or loss of materials.

2. LEVEL 2 CUT / A slightly deeper cut the exposes the fine aggregates and begins to expose the coarse aggregates. Also referred to as a salt and pepper finish.

3. LEVEL 3 CUT / A deep cut that exposes the coarse aggregates in the surface

B. SPECIFIED POLISHED FLOOR DETAILS

1. Specified Floor Finish shall have a Cut Level of LEVEL 2 CUT

2. Specified Floor Finish shall have a Gloss Level of Level B Sheen

3. Specified FLOR-COLOR shall be Ameripolish Midnight Black.

4. See addendum for specific steps.

C. POLISHING ADDENDUM – LEVEL A

1. DIAMATIC FLOR-COLOR INSTALLATION / LEVEL 1 CUT / GLOSS LEVEL A

a. GRIND/POLISH #1: DIAMATIC 60/80 Grit Metal Bonded Diamonds.

b. Broom and vacuum the floor to remove all residual dust.

c. GRIND/POLISH #2: DIAMATIC #1 Transitional Diamonds, Ceramic Bonded.

d. Broom and vacuum the floor to remove all residual dust.

e. GRIND/POLISH #4: DIAMATIC 400 Grit Resin Bonded Diamonds.

f. Broom and vacuum the floor to remove all residual dust.

g. Auto scrub the surface to completely clean and remove any remaining dust. Allow the surface to dry completely before the DIAMATIC FLOR-COLOR™ Application.

h. Apply DIAMATIC® FLOR-COLOR™ according to the technical data guidelines at the rate of 400-500 square feet per gallon. Allow to dry completely before continuing to the next step, (a minimum time of 1-2 hours)

i. Apply DIAMATIC® FLOR-SIL™ per application instructions at a rate of 400 square feet per gallon.

j. Allow DIAMATIC® FLOR-SIL™ to dry 1 hour before continuing on to the next step.

k. GRIND/POLISH #5: DIAMATIC 400 Grit Resin Bonded Diamond. To remove any residual color from the surface.

l. Broom and vacuum the floor to remove all residual dust.

m. MICROPOLISH/BURNISH #1: FLOR-GRIT 400 Diamond Impregnated Pad.

n. Dry mop the floor clean to remove all debris.

o. Apply DIAMATIC FLOR-FINISH L (Low Gloss) per application instructions at a rate of 2,500-3,000 square feet per gallon.

p. Allow to dry a minimum of 15-30 minutes.

q. MICROPOLISH/BURNISH #2: FLOR-GRIT 400 Diamond Impregnated Pad.

r. Dry mop the floor clean to remove all debris.

s. Apply DIAMATIC FLOR-FINISH L (Low Gloss) per application instructions at a rate of 3,000 square feet per gallon, 90 degrees to the first application.

t. Allow to dry a minimum of 15 minutes.

u. MICROPOLISH/BURNISH #3: FLOR-GRIT 400 Diamond Impregnated Pad

D. POLISHING ADDENDUM LEVEL B.

1. Level B Gloss – Medium gloss reading of 41 – 55.

a. GRIND/POLISH #1: DIAMATIC 60/80 Grit Metal Bonded Diamonds.

b. Broom and vacuum the floor to remove all residual dust.

c. GRIND/POLISH #2: DIAMATIC #1 Transitional Diamonds, Ceramic Bonded.

d. Broom and vacuum the floor to remove all residual dust.

e. GRIND/POLISH #3: DIAMATIC 200 Grit Resin Bonded Diamonds.

f. Broom and vacuum the floor to remove all residual dust.

g. Apply DIAMATIC FLOR-SIL™ per application instructions at a rate of 400 square feet per gallon.

h. Allow DIAMATIC FLOR-SIL™ to dry 1 hour before continuing on to the next step.

i. GRIND/POLISH #4: DIAMATIC 400 Grit Resin Bonded Diamonds.

j. Broom and vacuum the floor to remove all residual dust.

k. GRIND/POLISH #5: DIAMATIC 800 Grit Resin Bonded Diamonds.

l. Broom and vacuum the floor to remove all residual dust.

m. MICROPOLISH/BURNISH #1: FLOR-GRIT 800 Diamond Impregnated Pad.

n. Dry mop the floor clean to remove all debris.

o. Apply DIAMATIC FLOR-FINISH (High Gloss) per application instructions at a rate of 2,500-3,000square feet per gallon.

p. Allow to dry a minimum of 15-30 minutes.

q. MICROPOLISH/BURNISH #2: FLOR-GRIT 800 Diamond Impregnated Pad.

r. Dry mop the floor clean to remove all debris.

s. Apply DIAMATIC FLOR-FINISH (High Gloss) per application instructions at a rate of 3,000 square feet per gallon, 90 degrees to the first application.

t. Allow to dry a minimum of 15 minutes.

u. MICROPOLISH/BURNISH #3: FLOR-GRIT 1500 Diamond Impregnated Pad.

D. POLISHING ADDENDUM LEVEL C.

1. Level C Gloss – High gloss reading of 56 and higher.

a. GRIND/POLISH #1: DIAMATIC 60/80 Grit Metal Bonded Diamonds.

b. Broom and vacuum the floor to remove all residual dust.

c. GRIND/POLISH #2: DIAMATIC #1 Transitional Diamonds, Ceramic Bonded.

d. Broom and vacuum the floor to remove all residual dust.

e. GRIND/POLISH #3: DIAMATIC 200 Grit Resin Bonded Diamonds.

f. Broom and vacuum the floor to remove all residual dust.

g. Apply DIAMATIC FLOR-SIL™ per application instructions at a rate of 400 square feet per gallon.

h. Allow DIAMATIC FLOR-SIL™ to dry 1 hour before continuing on to the next step.

i. GRIND/POLISH #4: DIAMATIC 400 Grit Resin Bonded Diamonds.

j. Broom and vacuum the floor to remove all residual dust.

k. GRIND/POLISH #5: DIAMATIC 800 Grit Resin Bonded Diamonds.

l. Broom and vacuum the floor to remove all residual dust.

m. GRIND/POLISH #6: DIAMATIC1500 Grit Resin Bonded Diamonds.

n. Broom and vacuum the floor to remove all residual dust.

o. MICROPOLISH/BURNISH #1: FLOR-GRIT 1500 Diamond Impregnated Pad.

p. Dry mop the floor clean to remove all debris. Check gloss level here; if not above a 56 then continue to a 3000 grit resin bonded diamond.

q. Apply DIAMATIC FLOR-FINISH (High Gloss) per application instructions at a rate of 2,500-3,000 square feet per gallon.

r. Allow to dry a minimum of 15-30 minutes.

s. ROPOLISH/BURNISH #2: FLOR-GRIT 1500 Diamond Impregnated Pad.

t. Dry mop the floor clean to remove all debris.

u. Apply DIAMATIC FLOR-FINISH (High Gloss) per application instructions at a rate of 3,000 square feet per gallon, 90 degrees to the first application.

v. Allow to dry a minimum of 15 minutes.

w. MICROPOLISH/BURNISH #3: FLOR-GRIT 3000 Diamond Impregnated Pad..

3.05 EDGES

A. Where desired, polished edge work of all areas shall be done with a 5” or 7” DIAMATIC Hand Held or Walk Behind polishing tool. The edge polishing process will match the corresponding steps outlined above for the desired gloss level, and each edge polishing step shall be done immediately after the matching main polishing step.

B. NOTE: All grinding and polishing completed with grinder/polisher equipment connected to a dust collector.

3.06 ACCEPTANCE

A. Remove all installation materials and any foreign materials resulting from the installation, from the site.

B. Clean adjacent surfaces and materials..

C. Perform post job walk to ensure that the ULTRAFLOR® DIAMATIC Concrete System has been completed per the process specication.

D. Take pictures of final product for documentation and submittal, if requested or required.

3.07 PROTECTION

A. Prevent any spills or stains from coming into contact with the floor. Clean any spills that may occur as quickly as possible Prevent any spills or stains from coming into contact with the floor. Clean any spills that may occur as quickly as possible.

B. Protect the finished ULTRAFLOR® DIAMATIC® Polished Concrete System from continuing construction and build out as needed by installing the DIAMATIC ECONO COVER Protective Floor Covering or APPROVED equal.

1. The installation of the DIAMATIC® Protective Covering must be approved by the Installer and General Contractor of the ULTRAFLOR® installation.

2. If the DIAMATIC® Protective Cover is damaged during use, then that section must be cut out and replaced to maintain the integrity of the protective covering.

3. The DIAMATIC® Protective Cover can be removed after build out is complete.

4.01 ONGOING MAINTENANCE

A. Restrict using water on the surface for 72 hours after initial installation. The surface should not be cleaned using a string mop for 60 days to avoid streaking of the FLOR-FINISH. Avoid using mats or treated coverings for a minimum of 14 days to allow the finish to fully cure.

B. DO NOT USE cleaners that are acidic or have citrus (de-limonene) or butyl compounds. Although the ULTRAFLOR® DIAMATIC® Polished Concrete System is chemical and stain resistant, the application of these high acid cleaners may etch the surface and cause a residual stain. Regular maintenance and cleaning will help prolong surface shine

DAILY MAINTENANCE

A. Once the system is fully cured out (min. 72 hours), routinely sweep, dry mop, use of a high quality micro-fiber dust mop is the best method. A neutral pH cleaner only may be used when soils or stains must be removed. Any standing water should be removed immediately after cleaning.

B. An auto-scrubber may be used if equipped with a vacuum system to remove any standing water. The equipment tank should be filled with clean water only, NO CHEMICALS. The scrubber should be equipped with a soft pad only, DO NOT USE A BRUSH attachment.

WEEKLY MAINTENANCE

A. An auto-scrubber may be used if equipped with a vacuum system to remove any standing water. The equipment tank should be filled with clean water only, NO CHEMICALS. The scrubber should be equipped with a soft pad only, DO NOT USE A BRUSH attachment.

B. Use of a BURNISHER equipped with a FLOR-GRIT pad may be used as needed to restore gloss to specified levels. An 800 or 1500 grit pad is recommended.

EXTENDED MAINTENANCE

A. After thorough cleaning a coat of the DIAMATIC® FLOR-FINISH may be applied to restore original gloss and increase the stain resistance on the surface. Follow all technical data instructions for proper application or consult the original floor installer for assistance.

B. Use of a BURNISHER equipped with a FLOR-GRIT pad may be used after the application of the FLOR-FINISH to restore gloss to specified levels. An 800 or 1500 grit pad is recommended.

END OF SECTION

SECTION 04 2000

UNIT MASONRY

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Concrete masonry units (CMU's).

B. Mortar and grout for masonry.

C. Reinforcement, anchorage, and accessories for masonry installation.

1.02 REFERENCES:

A. Section 01 3500 Quality Requirements

B. Section 01 4523: Testing and Inspection

C. TMS 402 - Building Code Requirements for Masonry Structures.

D. TMS 602 - Specifications for Masonry Structures.

E. California Building Code (CBC), 2019 Edition

1.03 SUBMITTALS:

A. Product Data: Provide manufacturer's specifications and engineering data on block units, reinforcing and accessories.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109 or C780 for compressive strength, ASTM C1506 for water retention, and ASTM C91 for air content.

2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

C. Samples: Submit the following:

1. Two Samples of each type of masonry unit to show full range of color and texture, for selection and approval.

2. Samples of cured dry mortar showing finish color.

3. Cured sealant colors for control joints.

4. Control joint filler, 12" pieces of each size and type.

3

D. Sample Panels: Prepare as noted per specification section 01 3500 Quality Requirements. Installed masonry shall conform with the approved panels. Sample panels may not be a part of the permanent construction.

1. Minimum 6-foot long by 4-foot high panel of vertical masonry, including special features and one corner or angle. Panel to include:
   a. Plaster finish
   b. Reveals
   c. Connection to glazing.
   d. Parapet cap.

1.04 QUALITY ASSURANCE:

A. Masonry Standard: Conform to CBC, Chapter 21A and to referenced standard herein. In case of conflict between standards, the most stringent requirements govern.

B. Fire Performance Characteristics: For fire rated construction, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E 119 by a testing and inspecting organization such as UL, by equivalent concrete masonry thickness, or by authority having jurisdiction.

C. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

D. Source Quality Control: Testing Laboratory shall perform following quality assurance tests:

1. Portland Cement: Furnish mill sampled and tested Portland cement and furnish certificates of compliance for each shipment of cement used; otherwise, Testing Laboratory shall sample and test the cement according to ASTM C150-07.

2. Mortar and Grout Aggregates: Furnish grading tickets from producer; otherwise, Testing Laboratory shall sample and test aggregates according to the material specifications.

3. Concrete Masonry Units: Test units per Section 2103A.1 of Title 24. Furnish manufacturer's certificate attesting that units delivered to site meet material and property requirements specified, including linear shrinkage requirements; otherwise, concrete masonry units shall be sampled from the material delivered to the site by the Testing Laboratory or Project Inspector and tested by Testing Laboratory as specified in ASTM C140-15 for conformance; test for linear shrinkage according to ASTM C426-07. Testing shall be completed and units approved prior to placing units in the Work.

4. Batch Plant Inspection: If high lift grouting method is used, grout shall be batched and delivered to site ready-mixed from a batch plant conforming to ASTM C94-17. Continuous batch plant inspection is required, performed by a specially qualified inspector. Provided batch plant conforms to CBC Section 1705A.3.3, bonded deputy weighmaster affidavit is acceptable for grout; load tickets shall state amounts of grout ingredients and the weighmaster shall sign all load tickets and furnish legible copies to Architect, and Project Inspector.

1.05 MOCK-UP PANEL:

A. Erect mock-up panel of a minimum 6-foot long by 4-foot high panel of vertical masonry, including special features and one corner or angle.. Panel to include:

1. Specified mortar and accessories.

2. Samples of all types and sizes of units specified.

3. Samples of all shapes required for the work including lintel blocks and corner units.

4. Samples of all block colors required.

5. Plaster finish

6. Reveals

7. Connection to glazing.

8. Parapet cap.

B. When accepted by Architect, mock-up will demonstrate minimum standard for the Work. **Mock up may not be part of work.**

C. No work of this section shall be started prior to acceptance of mock-up by Architect.

1.06 PRE INSTALLATION CONFERENCE:

A. Convene after completion of mock-up panel and at least one week prior to commencing work of this Section

B. Provide two weeks written notice of time and date of meeting to Owner and Architect.

C. Review layout, materials, reinforcing and grouting procedures and any special conditions required to complete work.

D. The following personnel are required to be in attendance:

1. General Contractor's Superintendent.

2. Prime Subcontractors involved including subcontractors providing items to be installed or grouted in during masonry work and those providing work adjacent to masonry.

3. Owner and Architects representative.

1.07 PROJECT CONDITIONS:

A. Cold-Weather Requirements:

1. Do not use frozen materials or materials mixed or coated with ice or frost.

2. Do not build on frozen substrates.

3. Remove and replace unit masonry damaged by frost or by freezing conditions.

4. Comply with cold-weather construction requirements contained in TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 - PRODUCTS

2.01 MANUFACTURERS CONCRETE MASONRY UNITS:

A. Orco Block

B. Allied Concrete

C. Cinderlite.

D. Superlite Block.

E. Rinker Materials.

2.02 TYPES OF UNITS:

A. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. CMU: ASTM C90, standard precision type medium weight units, steam-cured or yard air cured for 28 days, meeting Quality Control Standards of Concrete Masonry Association, natural cement color smooth faced units unless otherwise indicated or specified. Include matching jamb, lintel, control joint, bond beam, wall cap, and other special shape, type, or size units as required. Provide 2-inch high CMU cap for all site walls. Size and color to match CMU.

C. Split-Face Concrete Block: Same as above, integrally colored of the color indicated by architect, with approved split texture on all exposed faces and ends. For location of this type of block see Architectural Elevations.

D. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi.

E. Provide texture, shape and color as directed and approved by the Architect.

F. Standard grey units may be used where they are totally concealed from view.

G. See the Architectural drawings for the layup pattern and mortar joint locations.

H. Density Classification: Medium weight, unless otherwise indicated.

I. Glazed Masonry: Pre-faced Block Units complying with ASTM C744 with resinous surface for exterior application.

1. Surface shall be smooth, sating finish, color as shown on drawings.

2. Block shall be as specified for concrete masonry Units.

2.03 CONCRETE AND MASONRY LINTELS:

A. General: Provide one of the following:

B. Masonry Lintels: Prefabricated with reinforcing bars placed as indicated and filled with coarse grout.

2.04 MORTAR AND GROUT MATERIALS:

A. Portland Cement: ASTM C150, Type I or Type II, low alkali; mortar cement not permitted. Provide natural color or white cement as required to produce the mortar color indicated.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.

D. Aggregate for Mortar: ASTM C144.

1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

E. Aggregate for Grout: ARTICLE 2.2 TMS 602, coarse type.

F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of the composition indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Euclid Chemical Company (The); Accelguard 80.

b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.

c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

G. Water: Potable.

H. Control joint filler: Dur-O-Wal "Rapid Control Joint", wide flange unless regular flange is shown, approved sizes, as noted on the drawings. Provide control joint at non shear-walls (walls in all yards and wall line CL between Normal Power and storage rooms) at intervals indicated in the drawings.

I. Mortar admix: None without prior approval of Architect, Structural Engineer.

J. Grout admix: Sika Grout Aid II. No other admixtures shall be used without prior approval of Architect/Structural Engineer. Alternate admixtures shall be of the type that reduces early water loss to the masonry units and produces an expansive action in the plastic grout sufficient to offset initial shrinkage and promote bonding of the grout to all interior surfaces of the masonry units.

K. Color pigment: Pure ground mineral oxides, non-fading, alkali and lime proof, factory packaged, not more than 3 pounds per sack of cement, as noted on the drawings.

2.05 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade, deformed billet steel bars. Contractor may

use 40 ksi where allowed by Structural Drawings.

B. Joint Reinforcing: Galvanized steel wire as noted on structural drawings. Provide stainless steel where required by code.

2.06 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82; with ASTM A153, Class B-2 coating.

2. Steel Sheet, Galvanized after Fabrication: ASTM A1008, Commercial Steel, with ASTM A153, Class B coating.

3. Steel Plates, Shapes, and Bars: ASTM A36.

B. Anchor Bolts: Headed steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A153, Class C; of dimensions indicated.

2.07 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

2. Use Portland cement-lime mortar, unless otherwise indicated.

3. For exterior masonry, use Portland cement-lime mortar.

4. For reinforced masonry, use Portland cement-lime mortar.

5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Proportions: Accurately measure all mortar and grout by the volume method using calibrated containers. Shovel measurements are not acceptable.

1. Mortar: Per CBC Section 2103A.2 conforming to ASTM 270 Type S or M.

2. Grout: Per CBC Section 2103A.3.

3. Colored Mortar: Same as for mortar plus add color pigment to produce cured dry color matching concrete unit color and the approved Sample.

C. Mortar for Unit Masonry: Shall conform to ASTM C270 and CBC requirements. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S.

2. For reinforced masonry, use Type S.

3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.

D. Grout for Unit Masonry: Comply with CBC requirements.

1. Grout shall conform to the requirements of Section 2103A of the CBC.

2. Use course grout that will comply with Table 6 in TMS 602 for dimensions of grout spaces and pour height.

3. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.

4. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

E. Mixing: Place half of the required water and sand in an operating machine mixer; then add Portland cement, remainder of sand and water, and then hydrated lime. Machine mix not less than 5 minutes after all ingredients are charged. Mixing shall be performed in accordance to mix design developed per Section 2.07 and submitted per Section 1.2.D above.

F. Retempering: Retemper mortar within one hour after leaving the mixer and maintain high plasticity. Add water in a basin formed in the mortar and rework mortar into water. Discard all mortar that is not used within one hour or that has begun to initially set.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL:

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

3.02 LAYING MASONRY WALLS:

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations. Construct all masonry in accordance with Code and Concrete Masonry Association standards for reinforced masonry. Place and embed in masonry anchors, bolts, reglets, sleeves, conduits, and all other items furnished under other Sections, fully grouted in place. Work out details and be responsible for size, position, and arrangement of embedded items and necessary openings. Cut units by machine saw. Install only clean uncracked units. Conform to CBC Section 2104A.

B. Setting: Install masonry to preserve unobstructed vertical continuity of block cells. Full bed face shells and cross webs in mortar. Fill header or end joints solid with mortar to a depth from face of wall or unit not less than the thickness of the longitudinal face shells. Provide corner bond by lapping units in successive vertical courses.

C. Reinforcing: Use deep-cut bond beam units at typical horizontal reinforcing bars. Use U-shaped lintel units over wall openings. Install open end units for vertical bars unless otherwise shown. Hold vertical reinforcing bars in correct position at top, bottom, and intervals not over 160 bar diameters between, and secure in place with wood frames or similar devices as required for proper alignment. Install horizontal reinforcement as erection progresses, laps wire tied. Maintain a minimum ½” clear space between masonry and bars. Make laps and splices in bars not less than 48 bar diameters unless otherwise indicated.

D. Grouting - Low Lift: Fill all cells with grout. Pour in 4-foot lifts, waiting about 1-hour between lifts. Pour full height in each section of the wall in one work shift. Consolidate grout by puddling or internal vibration, then reconsolidate about 10 minutes later before plasticity is lost. Form horizontal construction joints by stopping the grout pour 1-1/2" below top of masonry units. Conform to CBC Sections 2104A.1.3.1.2.

E. Bond Pattern for Exposed Masonry:

1. Glazed CMU: Stack bond unless otherwise indicated; do not use units with less than nominal 4 inch horizontal face dimensions at corners or jambs.

2. Other Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4 inch horizontal face dimensions at

corners or jambs.

a. Lay units with 1/2-unit running bond, vertical joints in alternate courses aligned and plumb. Make joints uniformly 3/8" size, concealed joints struck flush. For joints in walls to receive waterproof membranes, use care to obtain smooth surface to receive waterproofing. Compact and dense con-cave tool exposed joints with 1-1/2" diameter plastic or similar non-staining tool.

F. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

G. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.03 MORTAR BEDDING AND JOINTING:

A. Lay masonry units as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.

2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.

3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.

4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.04 REINFORCED UNIT MASONRY INSTALLATION:

A. Temporary Formwork and Shores:

1. Construct formwork and shores as needed to support reinforced masonry elements during construction.

2. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

3. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602.

C. Grouting:

1. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure (24 hours minimum).

2. Comply with requirements in TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3. Limit height of vertical grout pours to not more than 60 inches.

3.05 CONTROL AND EXPANSION JOINTS:

A. Install control and expansion joints at the following maximum spacings, unless otherwise indicated on Drawings:

1. Exterior Walls: 20 feet on center and within 24 inches on one side of each interior and exterior corner.

2. Interior Walls: 30 feet on center.

3. At changes in wall height.

B. Do not continue horizontal joint reinforcement through control and expansion joints unless shown otherwise on drawings.

C. Install preformed control joint device in continuous lengths. Seal butt and corner joints.

D. Form expansion joint by omitting mortar and cutting unit to form open space.

3.06 TOLERANCES:

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation: Plus 1/2 inch or minus 1/4 inch.

2. For location of elements in plan: Plus or minus 1/2 inch.

3. For location of elements in elevation: Plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, 1/4 inch in 10 feet, or 1/2 inch maximum.

2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals: 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

3. For vertical lines and surfaces: 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints: 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

5. For lines and surfaces: 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints: Plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.

2. For head and collar joints: Plus 3/8 inch or minus 1/4 inch.

3. For exposed head joints: Plus or minus 1/8 inch.

3.07 FIELD QUALITY CONTROL:

A. Testing and Inspecting:

1. Continuous Inspection: Construct masonry under continuous inspection of a specially approved inspector as required by CBC Chapter 17A; the special inspector shall furnish a verified report as described in CBC Section 1704A.2.4.

2. Owner will engage a special inspection and testing agency to perform tests and inspections and prepare reports.

3. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections.

4. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Level B special inspections according to the ACI 530.

1. Begin masonry construction only after inspectors have verified proportions of site-

prepared mortar.

2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.

3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Mortar and Grout Testing: Testing Laboratory shall test mortar and grout in accordance with CBC Section 2103A2.1 and DSA 103 form including additional sampling and testing as required by Architect or Structural Engineer.

F. Masonry Core Tests: Testing Laboratory shall take and test masonry cores in accordance with CBC Section 2105A.4. Take cores in locations as designated by Architect or Structural Engineer. Contractor shall restore walls from which cores are taken with whole face shells or complete units as approved.

3.08 REPAIRING, POINTING, AND CLEANING:

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.

2. Protect surfaces from contact with cleaner.

3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.

4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to the type of stain on exposed surfaces.

END OF SECTION

SECTION 05 1200

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Structural steel.

2. Architecturally exposed structural steel.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 01 4523 - Testing and Inspection.

3. Section 03 3000 - Cast-In-Place Concrete.

4. Section 04 2200 - Concrete Unit Masonry.

5. Section 05 3000 - Metal Decking.

6. Section 05 5000 - Metal Fabrications.

7. Section 09 9113 – Exterior Painting.

8. Section 09 9123 – Interior Painting

1.02 REFERENCES

A. CBC Chapter 22A.

B. American Institute of Steel Construction (AISC):

1. AISC – Steel Construction Manual:

a. AISC 360 Specifications for Structural Steel Buildings.

b. AISC Code of Standard Practice for Steel Buildings and Bridges.

c. RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.

2. AISC 341 - Seismic Provisions for Structural Steel Buildings, including Supplements.

3. AISC 358 - Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications.

C. American Society for Testing and Materials (ASTM):

1. ASTM A36 – Standard Specification for Carbon Structural Steel.

2. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

3. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

4. ASTM A123 – Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

5. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

6. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength.

7. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 Ksi Minimum Tensile Strength.

8. ASTM A435 - Standard Specification for Straight-Beam Ultrasonic Examination of Steel Plates.

9. ASTM A490 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

10. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

11. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

12. ASTM A572 – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

13. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

14. ASTM A673 - Standard Specification for Sampling Procedure for Impact Testing of Structural Steel,

15. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

16. ASTM A992 – Standard Specification for Structural Steel Shapes.

17. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).

18. ASTM E23 - Standard Test Methods for Notched Bar Impact Testing of Metallic Materials.

19. ASTM E112 - Standard Test Methods for Determining Average Grain Size.

20. ASTM F436 – Standard Specification for Hardened Steel Washers.

21. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

22. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-Ksi Yield Strength.

D. American Welding Society (AWS):

1. AWS D1.1 – Structural Welding Code - Steel.

2. AWS D1.8 – Structural Welding Code – Seismic Supplement.

2. AWS A2.4 – Standard Symbols for Welding, Brazing, and Nondestructive Examination.

3. AWS B2.1 – Specifications for Welding Procedures and Performance Qualification.

E. SSPC – Steel Structures Painting Council:

1. SP-2 - Hand Tool Cleaning.

2. PA-1 - Paint Application Specification No. 1.

1.03 REGULATORY REQUIREMENTS

A. Structural steel shall conform to CBC requirements, except that steel manufactured by acid Bessemer process is not permitted for structural purposes.

B. Sheet and strip steel other than those listed in CBC, if provided for structural purpose, shall comply with DSA requirements.

1.04 SUBMITTALS

A. Shop Drawings:

1. Submit Shop Drawings, including complete details and schedules for fabrication and shop assembly of members, and details, schedules, procedures and diagrams showing the sequence of erection. Fully detail minor connections and fastenings not shown or specified in the Contract Documents to meet required conditions using similar detailing as shown in the Contract Documents. Include a fully detailed, well controlled sequence and technique plan for shop and field welding that minimizes locked in stresses and distortion; submit sequence and technique plan for review by the Architect.

a. Include details of cuts, connections, camber, and holes in accordance with Figure 4.5 of AWS D1.1 or AISC Chapter J, weld position plan and other pertinent data. Indicate welds by standard AWS symbols, and show size, length and type of each weld.

b. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed for Work specified in other sections.

c. Erection and Bracing Plan and Erection Procedure: Submit an erection and framing plan, including columns, beams, and girders, signed and sealed by a Structural or Civil Engineer registered in the State of California in accordance with Title 8 California Code of Regulations, Section 1710, Erection of Structures. Maintain a copy at the Project site as required by the California Division of Industrial Safety.

d. Submit a list of steel items to be galvanized.

e. Include identification and details of Architecturally Exposed Structural Steel (AESS) members, if applicable.

B. Product Data:

1. Submit copies of fabricator's specifications and installation instructions for the following products. Include laboratory test reports and other data required demonstrating compliance with these Specifications:

a. Structural steel, each type; including certified copies of mill reports covering chemical and physical properties.

b. Welding electrodes.

c. Welding gas.

d. Unfinished bolts and nuts.

e. Structural steel primer paint.

f. High-strength bolts, including nuts and washers.

C. Manufacturer's Mill Certificate:

1. Submit, certifying that products meet or exceed specified requirements.

D. Mill Test Reports:

1. Submit manufacturer's certificates, indicating structural yield and tensile strength, destructive and non-destructive test analysis.

E. Welding Procedure Specifications (WPS): Submit weld procedures for all welding on project to Owner's testing laboratory for approval. After approval by testing laboratory, submit to Architect for record. Weld procedures shall be qualified as described in AWS D1.1, AISC 341 and AISC 358, as applicable. Weld procedures shall indicate joints details and tolerances, preheat and interpass temperature, post-heat treatment, single or multiple stringer passes, peening of stringer passes for groove welds except for the first and the last pass, electrode type and size, welding current, polarity and amperes and root treatment. The welding variables for each stringer pass shall be recorded and averaged; from these averages the weld heat input shall be calculated. Submit the manufacturer's product data sheet for all welding material used.

F. Welder's Certificates: Field welders shall be Project certified in accordance with AWS D1.1. Shop welders shall be Project certified for FCAW in accordance with AWS D1.1.

G. Test Reports: Submit reports of tests conducted on shop and field welded and bolted connections. Include data on type of test conducted and test results.

H. Welding Material Certification: Provide certificate that welding material complies with specifications. Submit to Owner's testing laboratory.

1.05 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement, except as otherwise indicated:

1. American Institute of Steel Construction (AISC) “Code of Standard Practice for Steel Buildings and Bridges, modified as follows:

   a. Replace “Structural Design Drawings” with “Contract Documents’ throughout the document.

   b. Paragraph 3.2 is hereby modified in it’s entirety as follows:

      “Contract Documents including but not limited to architectural, mechanical, plumbing, electrical, civil and theater design drawings and specifications shall be used as supplement to the structural plans to define configurations and construction information.”

   c. Delete Paragraph 3.3.

   d. In Paragraph 4.4, delete the following sentence:

      “These drawings shall be returned to the Fabricator within 14 calendar days.”

   e. Delete Paragraph 4.4.1.(a) in its entirety.

   f. Paragraph 4.4.2 is hereby modified in it’s entirety as follows:

      “No review action, implicit or explicit, shall be interpreted to authorize changes in the Contract Documents.”

2. Perform welding in accordance with AWS Standards, AWS D1.1, AWS D1.8, and California Building Code Section 2204A.1 and approved Weld Procedure Specifications (WPS).

3. Welding for Seismic Force-Resisting elements shall be in compliance with AISC 341 and AISC 358.

B. Shop fabrication shall be inspected in accordance with Section 01 4523 - Testing and Inspection and DSA Testing and Inspections form 103.

C. Erect mock-up panel of fabricated structural steel meeting Architecturally Exposed Structural Steel (AESS) tolerances for exposed areas. Approval by Architect is required. Provide one mock-up of connection at round column and horizontal girt per detail 18 S0.10. Mock-up shall be 4’-0” high by 3’-0” wide showing welded connection of girt to column and painted finish.

Mock-up to remain for comparison but may not be left as part of the work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Store structural steel above grade on platforms, skids or other supports.

B. Protect steel from corrosion.

C. Store welding electrodes in accordance with AWS D 1.1.

D. Store other materials in a weather-tight and dry place until installed into the Work.

PART 2 - PRODUCTS

2.01 GENERAL

A. Stock Materials: Provide exact materials, sections, shapes, thickness, sizes, weights, and details of construction indicated on Drawings. Changes because of material stock or shop practices will be considered if net area of shape or section is not reduced thereby, if material and structural properties are at least equivalent, and if overall dimensions are not exceeded.

B. Shapes, bars, plates, tubes and pipes shall be made of materials with at least 16 percent recycled content if produced from Basic Oxygen Furnace (BOF) or at least 67 percent recycled content if produced from Electric Arc Furnace (EAF).

2.02 MATERIALS

A. Structural Steel: All wide flange shapes shall conform to ASTM A992 grade 50. Other steel shall conform to ASTM A36, unless indicated otherwise on Drawings.

B. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular low carbon bolts and nuts.

C. High-Strength Threaded Fasteners: ASTM A325, ASTM A490 ASTM F959 or ASTM F1852 quenched and tempered, steel bolts, nuts and washers.

D. Primers: Lead-free metal primer:

1. SSPC-Paint 20, Zinc-Rich Primer.

2. SSPC-Paint 23, Latex Primer.

3. SSPC-Paint 25 Zinc Oxide Primer.

E. Steel Pipe: ASTM A53, Type E or S, Grade B.

F. Structural Tubing:

1. Hot-formed, ASTM A501, Grade B.

2. Cold-formed, ASTM A500, Grade C.

G. Galvanizing: ASTM A123.

H. Welding Electrodes: Provide electrodes recommended by manufacturer for seismic connections.

1. Comply with AISC 341 and AWS D1.8.

I. Shear stud connectors: ASTM A108, Grade 1015 forged steel, headed, uncoated, granular flux filled shear connector or anchor studs by Nelson Stud Welding Division, or equal.

J. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at seven days; of consistency suitable for application and a 30 minute working time.

2.03 FABRICATION

A. Cleaning and Straightening Materials: Materials being fabricated shall be thoroughly cleaned of scale and rust, and straightened before fabrication. Cleaning and straightening methods shall not damage material. After punching or fabrication of component parts of a member, twists or bends shall be removed before parts are assembled.

B. Cutting, Punching, Drilling and Tapping: Unless otherwise indicated or specified, structural steel fabricator shall perform the cutting, punching, drilling and tapping of Work so that Work of other trades will properly connect to steel Work.

C. Milling: Compression joints depending on contact bearing shall be furnished with bearing surfaces prepared to a common plane by milling.

D. Use of Burning Torch: Oxygen cutting of members shall be performed by machine. Gouges greater than 3/16 inch that remain from cutting shall be removed by grinding. Reentrant corners shall be shaped notch free to a radius of at least 1/2 inch. Gas cutting of holes for bolts or rivets is not permitted.

E. Galvanizing: After fabrication, items indicated or specified to be galvanized shall be galvanized in largest practical sizes. Fabrication includes operations of shearing, punching, bending, forming, assembling or welding. Galvanized items shall be free from projections, barbs, or icicles resulting from the galvanizing process.

F. Welding:

1. Type of steel furnished in welded structures shall provide chemical properties suitable for welding as determined by chemical analysis. Welds shall conform to the verification and inspection requirements of CBC Chapter 17A. Conform to AWS D1.1, AWS D1.8, and CBC Chapter 22A.

2. Materials and workmanship shall conform to the requirements specified herein and to CBC requirements, modified as follows:

   a. No welded splices shall be permitted except those indicated on Drawings unless specifically reviewed by the Architect.

   b. Drawings will designate joints in which it is important that welding sequence and technique be controlled to minimize shrinkage stresses and distortion.

3. Welding shall be performed in accordance with requirements of the AWS Structural Welding Code.

   a. Welded Joint Details: Comply with AISC 341, AISC 358 and drawing details.

4. Architecturally Exposed Structural Steel: Verify that weld sizes, fabrication sequence, and equipment used for Architecturally Exposed Structural Steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds ½ inch and larger. Grind flush butt welds. Dress exposed welds.

5. Remove erection bolts on welded, Architecturally Exposed Structural Steel; fill holes with plug welds; and grind smooth at exposed surfaces.

G. Shop Finish:

1. Notify the Project Inspector when Work is ready to receive shop prime coat. Work shall be inspected by the Project Inspector before installation of primer.

2. Structural steel and fittings shall receive a coat of primer, except:

   a. Surfaces that will be galvanized.

   b. Surfaces that will be fireproofed.

   c. Surfaces that will be field welded.

   d. Surfaces in contact with concrete.

   e. Surfaces high strength bolted.

3. The primer specified shall be spray applied, filling joints and corners and covering surfaces with a smooth unbroken film. The minimum dry film thickness of the primer shall be 2.0 mils.

H. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

I Fabricate Architecturally Exposed Structural Steel with exposed surfaces smooth, square, and free of surfaces blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.

1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating and shop priming.

2. Comply with fabrication requirements, including tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for Architecturally Exposed Structural Steel.

2.04 SHOP AND FIELD QUALITY CONTROL

A. A special inspector, approved by DSA to inspect the Work of this section, shall inspect high-strength bolted connections. The Owner will provide a DSA approved independent testing laboratory to perform tests and prepare test reports in accordance with CBC 1705A.2.6. The Project Inspector shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.

B. An AWS CWI certified special inspector, approved by DSA to inspect the Work of this section, shall inspect welded connections in accordance with CBC 1705A.2.5. The Owner will provide a DSA approved independent testing laboratory to perform tests and prepare test reports. The Project Inspector shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.

C. The independent testing laboratory shall conduct and interpret test and state in each report whether test specimens comply with requirements, and specifically state any deviations there from.

D. Provide access to all places where structural steel Work is being fabricated or produced so required inspection and testing can be performed.

E. The independent testing laboratory may inspect or test structural steel at plant before shipment; however, Architect reserves the right at any time before Contract Completion to deem materials not in compliance with the specified requirements as defective Work.

F. Correct defects in structural Work when inspections and laboratory test reports indicate noncompliance with specified requirements. Perform additional tests as may be required to reconfirm noncompliance of original Work, and as may be required to show demonstrate compliance of corrected Work.

G. Inspection of Structural Tube Steel/Hollow Structural Sections (HSS): Structural tube steel members (round, square, rectangular), disregarding steel origin, will be inspected during shop fabrication per DSA Bulletin 07-03. Inspector will perform a visual examination of the seam weld area for visible discontinuities. When defects are suspected, non-destructive testing will be considered.

H. Welding: Inspect and test during fabrication and erection of structural steel assemblies as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in the Work. Record Work required and performed to correct deficiencies.

2. Inspect welds. Welds shall be visually inspected before performing any non-destructive testing. Groove weld shall be inspected by ultrasonic or other approved non-destructive test methods. Testing shall be performed to AWS D1.1 Table 6.3 cyclically loaded non-tubular connections.

3. Ultrasonic testing shall be performed by a specially trained and qualified technician who shall operate the equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. Repair and test defective welds.

4. Rate of Testing: Completed welds contained in joints and splices shall be tested 100 percent either by ultrasonic testing or by radiography.

5. Welds, when installed in column splices, shall be tested by either ultrasonic testing or radiography.

6. Base metal thicker than 1 ½-inch, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected by shear wave methods for discontinuities directly behind such welds. Tests shall be performed at least 48 hours after completed joint has cooled down to ambient air temperature.

7. Material discontinuities shall be reviewed based on the defect rating in accordance with the criteria of AWS D1.1 table 6.3 by the Architect and DSA.

8. Other method of non-destructive testing and inspection, for example, liquid dye penetrate testing, magnetic particle inspection or radiographic inspection may be performed on weld if required.

9. Lamellar Tearing: Lamellar-tearing resulting from welding is a crack (with zero tolerance) and shall be repaired in accordance with AWS D1.1.

10. Lamination: The rejection criteria shall be based on ASTM A435.

11. Where testing reveals lamination or conditions of lamellar tearing in base metal, the steel fabricator shall submit a proposed method of repair for review by the Architect. Test repaired areas as required.

12. Magnetic Particle Testing: Magnetic particle testing when required shall be provided in accordance with AWS D1.1 for procedure and technique. The standards of acceptance shall be in accordance with AWS D1.1 – Qualification.

I. Lamellar Tearing: Prior to welding plates 1 to 1 ½-inch thick and greater and rolled shapes within the distance from 6 inches above the top of the joint to 6 inches below the bottom of the joint shall be checked by ultrasonic testing for laminations in base metal which may interfere with the inspection of the completed joint. Should these defects occur, members will be reviewed by the Architect and DSA. Welding procedure specifications in sub-section 1.5G specify welding practices to minimize lamellar tearing.

J. Prior Testing of Base Material: Test material before fabrication.

K. Lines and levels of erected steel shall be certified by a State of California licensed surveyor as set forth in related Division 01 section.

L. Welded studs shall be tested and inspected by the special inspector in accordance with requirements of AWS D1.1 – Stud Welding.

M. Record Drawings: After steel has been erected, correct or revise Shop Drawings and erection diagrams to correspond with reviewed changes performed in the field.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify governing dimensions and conditions of the Work before commencing erection Work.

1. Report discrepancies between drawings and field dimensions to Architect before commencing work.

2. Beginning of installation means erector accepts existing conditions and surfaces underlying or adjacent to work of this section.

B. Provide temporary shoring and bracing, and other support during performance of the Work. Remove after steel is in place and connected, and after cast-in-place concrete has reached its design strength.

C. Coordinate prime coat repair and application with requirements of Section 09 9000.

3.02 ERECTION

A. Install structural steel accurately in locations, to elevations indicated, and according to AISC specifications and CBC requirements.

B. Clean surfaces of base plates and bearing plates.

1. Install base and bearing plates for structural members on wedges, shims, or setting nuts as required.

2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims; cut off flush with edge of base or bearing plate before packing with grout.

C. Maintain erection tolerances of structural steel within AISC Code of Standard Practice for Steel Buildings and Bridges.

1. Architecturally Exposed Structural Steel members and components, plumbed, leveled and aligned to a tolerance not to exceed one-half the amount permitted for structural steel. Contractor to provide adjustable connections between Architecturally Exposed Structural Steel and the structural steel frame or the masonry or concrete supports, in order to provide the erector with means for adjustment.

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact after assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

E. Do not permit thermal cutting during erection of structural steel.

F. Where indicated for field connections, provide standard bolts complying with ASTM F3125 GR. F1852.

G. Install high strength steel bolts at locations indicated. Assembly and installation shall be in accordance with CBC requirements.

1. Allowable hole sizes: 1/16 inch larger than bolt size.

2. Use friction type connection with standard hardened steel circular, square or rectangular washer under bolt nut.

3. Thoroughly clean area under bolt head, nut and washer. Remove all paint, lacquer, oil or other coatings except organic zinc-rich paints in accordance with SSPC, SP-2.

4. Tighten bolts by power torque wrench or hand wrench until twist-off.

H. Contractor shall be responsible for correcting detailing and fabrication errors and for correct fitting of all members and components.

I. Erect structural steel plumb and level and to proper tolerances as set forth in the AISC Manual. Provide temporary bracing, supports or connections required for complete safety of structure until final permanent connections are installed.

J. Install column bases within a tolerance of 1/8 inch of detailed centerlines, level at proper elevations. Support bases on double nuts and solidly fill spaces under bases with cement grout.

K. Provide anchor bolts with templates and diagrams. Contractor shall be responsible for proper location and installation of bolts. Correct deficiencies and errors.

L. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A780.

3.03 FITTING

A. Closely fit members, finished true to line and in precise position required to allow accurate erection and proper joining in the field.

B. Drilling to enlarge unfair holes will not be allowed. Allow only enough drifting during assembly to bring parts into position, but not enough to enlarge holes or distort the metal. Do not heat rolled sections, unless approved by Architect.

3.04 PUNCHING AND DRILLING

A. Punch material 1/16 inch larger than nominal diameter of bolt, wherever thickness of metal is equal to or less than the diameter of the bolt plus 1/8 inch.

B. Drill or sub-punch and ream where metal is equal to or more than the diameter of the bolt plus 1/8 inch. Make diameter for sub-punched and sub-drilled holes 1/16 inch larger than nominal diameter of bolt.

C. Precisely locate holes to ensure passage of bolt through assembled materials without drifting. Enlarge holes when necessary to receive bolts by reaming; flame cutting to enlarge holes is not acceptable. Structural Steel members with poorly matched holes will be rejected.

3.05 FINISHING

A. After erection, spots or surfaces where paint has been removed, damaged, or burned off, and field rivets, bolts, and other field connections shall be cleaned of dirt, oil, grease, and burned paint and furnished with a spot coat of the same primer installed during shop priming.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Install paint to exposed areas with the same material installed during shop painting. Install by brush or spray to provide a minimum dry film thickness of 1.5 mils.

3.06 FIELD QUALITY CONTROL

A. Owner will provide a special inspector and independent testing laboratory to perform field inspections and tests and to prepare test reports.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

3.07 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project Site.

3.08 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.09 HANDLING

A. Both in shop and in the field, transport, handle and erect to prevent damage or overstressing of any component.

END OF SECTION

SECTION 05 3000

METAL DECKING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Metal decking.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 01 4523 - Testing and Inspection.

3. Section 05 1200 - Structural Steel Framing.

4. Section 07 6000 - Flashing and Sheet Metal.

1.02 REFERENCES

A. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

D. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

E. AWS D1.3 – Structural Welding Code Sheet – Steel.

F. AISI S100-16: North American Specification for the Design of Cold-Formed Steel Structural Members, 2016 Edition.

1.03 PERFORMANCE REQUIREMENTS

A. Compute properties of deck sections on basis of effective design width as limited by provisions of the AISI specifications. Provide no less than deck section properties specified, including section modulus and moment of inertia per foot of width.

B. Regulatory Requirements:

1. Requirements of Regulatory Agencies: Underwriters Laboratories Inc. (UL) approval for the decking when installed as a part of an assembly indicated on Drawings in which fire resistive construction ratings are required.

2. Work of this section shall be in accordance with CBC.

C. Manufacturers shall be members of Steel Deck Institute (SDI).

1.04 SUBMITTALS

A. Shop Drawings: Drawings, sections and details indicate type of decking, location, finish, gage of metal, arrangement of sheets, necessary fabrication to incorporate decking into the Work, and relationship to openings and flashing.

1.05 QUALITY ASSURANCE

A. General: Metal decking steel shall conform to requirements of strengths and properties of standards specified.

B. Qualifications of Welders: Properly certified for the type of Work involved in compliance with CBC requirements.

C. Periodic inspection of welding will be performed by a special inspector, approved by DSA to inspect the Work of this section. Refer to Section 01 4523 - Testing and Inspection. The Project Inspector shall be responsible for monitoring the work of the special inspector to ensure that the inspection program is satisfactorily completed.

D. Identification of metal decking steel shall conform to the standards specified in Section 01 4523 - Testing and Inspection.

1. Fabricator shall furnish sufficient evidence to the Architect attesting compliance with specified requirements.

2. Conform to CBC requirements. Unclassified or unidentified decking is not permitted. Furnish deck manufacturer's certified mill analyses and test reports for each heat covering decking having a minimum Fy of 33 Ksi. In addition, for decking having F_y greater than 33 Ksi, testing laboratory shall perform one tension and elongation test and one bend or flattening test for each gage.

E. Unidentifiable Steel: Steel which is not readily identifiable as to grade from markings and test records is not permitted to be provided as part of the Work of this section.

F. Payment For Tests and Inspections:

1. Owner shall pay inspection and testing costs of identifiable steel.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. ASC Steel Deck.

B. Verco Manufacturing Co.

C. Epic Metals Corporation.

D. Equal.

2.02 MATERIALS

A. Metal Decking: Roll-formed sheets conforming to ASTM A653, with G60 zinc coating.

1. Section properties shall conform to applicable provisions of latest edition of AISI - Specification for the Design of Cold-Formed Steel Structural Members.

B. Flexible Closure Strips for Deck: Vulcanized, closed-cell, expanded chloroprene elastomer, complying with ASTM D1056, Grade SCE #41.

1. Brittleness Temperature: Minus 40 degrees F, ASTM D746.

2. Flammability Resistance: Self-extinguishing,

C. Metal Flashing and Closures: 22 gage minimum, with ASTM A653, G60 zinc coating.

2.03 FABRICATION

A. Provide sections as shown on structural drawings between supporting members.

B. Provide decking in lengths to span over two or more supports.

C. Except as detailed otherwise, provide decking with interlocking side laps, 2 ½-inch minimum end bearing, and 1 ½-inch minimum side bearing.

D. Welding: Provide materials and methods in accordance with recommendations of steel decking manufacturer and reviewed submittals. Hold decking tight to the supporting elements with screws or other means for proper welding or crimping of the decking edges. Conform to AWS D1.3, and to the patterns and weld types indicated, with welds free from sharp edges and protrusions. Field coat welds and abraded surfaces at completion with an anodic type galvanizing repair paint. Omit the field paint coating where welds or abrasions are covered by concrete fill or sprayed fireproofing.

PART 3 - EXECUTION

3.01 OPENINGS

A. Cut and reinforce units to provide openings which are located and dimensioned on the structural and mechanical Drawings.

B. Provide openings, or other Work not indicated on the Drawings.

3.02 INSTALLATION

A. Install metal decking in accordance with decking manufacturers' recommendations, requirements of Drawings, Shop Drawings, and Specifications.

B. Install metal decking on supporting steel framework and adjust to final position before permanently fastening in place.

1. Install each unit to proper bearing on supports.

2. Install units in straight alignment for entire length of run of cells with close registration of cells of one unit with those of abutting unit.

C. Fasten decking to steel framework at ends of units and at intermediate supports. Welding shall be as indicated on Drawings.

D. Fasten side laps between supports as indicated on Drawings.

E. Perform field cutting parallel with cells in area between cells, leaving sufficient horizontal material to permit welding to support steel.

3.03 METAL FLASHINGS AND CLOSURES

A. Furnish, install, and weld in position, sheet metal closure flashing, closure angles, closure plates, profile plates, and shear plates.

B. Close open ends of cell runs at columns, openings, walls, similar interruptions and termination.

3.04 FIELD QUALITY CONTROL

A. Inspection: Install steel decking under continuous inspection according to CBC Chapter 1705A.2.2.

1. Welding inspection for steel deck diaphragms shall conform to CBC Section 2204A.1.

3.05 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.06 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 05 4100

STRUCTURAL METAL STUD FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Load-bearing metal stud systems.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 01 4523 - Testing and Inspection.

3. Section 05 1200 - Structural Steel Framing.

4. Section 09 2216 - Non-Structural Metal Framing.

1.02 SUBMITTALS

A. Shop Drawings: Submit drawings showing framing, connection details, accessories and anchorage. Indicate location of assemblies, size and spacing of framing components.

B. Product Data: Submit manufacturer's catalog data for each item proposed for installation.

C. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.

1.03 QUALITY ASSURANCE

A. Comply with following as a minimum requirement:

1. AISI - Specifications for Design of Cold Formed Steel Structural Members.

2. Welds shall be performed by AWS certified welders. Welding shall be performed in accordance with requirements of American Welding Society (AWS) Structural Welding Code-Steel D1.1 and D1.3. Structural welding Code-Sheet Steel.

3. Welding shall be inspected by a special inspector, approved by DSA to inspect Work of this section. The Project Inspector shall be responsible for monitoring work of special inspector to ensure that inspection program is satisfactorily completed.

4. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by Hot Dip Process.

5. ASTM A924 – Standard Specification for General Requirements for Steel Sheet Metallic-Coated by Hot-Dip Process.

6. ASTM A1003 – Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.

7. ASTM A1008 – Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability.

8. ASTM C954 – Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks) and Bracing or Bridging for Screw Application of Gypsum Panel Products and Plaster Bases.

9. ASTM C955 – Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.

10. ASTM C1007 – Standard Specification for Installation of Structural (Axial and Transverse) Steel Framing Members and Accessories.

11. ASTM E488 – Standard Test Methods of Strength Anchors in Concrete and Masonry.

12. ASTM E1190 – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.

13. Manufacturer shall be a member of the Steel Stud Manufacturers Association (SSMA).

B. Tolerances: Install walls and partitions on straight lines, plumb, free of twists or other defects, and contacting a 10-foot straight edge for its entire length at any location within a 1/8 inch tolerance. Install horizontal framing level within a tolerance of 1/8 inch in 12 feet in any direction.

1.04 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered in their original unopened packages and stored protected from damage. Do not store material directly on grade. Provide adequate support to prevent bowing of material prior to installation.

B. Store welding electrodes in accordance with AWS D12.1.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide studs, tracks, joists, header, and accessories manufactured by one of following:

1. Clark Dietrich. (ICC ESR-1166P)

2. Marino/WARE. (ICC ESR-2620)

3. Cemco. (ICC ESR-2012)

4. Equal.

B. Special Connection Accessories: Products manufactured by The Steel Network, Inc., or equal.

2.02 MATERIALS

A. Light Gage Metal Framing:

1. Metal framing shall be formed from corrosion resistant-steel conforming to requirements of ASTM A653, 50 ksi minimum.

2. Metal framing shall be zinc coated in conformance to requirements of ASTM A926, G60.

3. Metal framing shall be manufactured in conformance to ASTM C955.

4. Install metal framing per ASTM C1007, Standard Specification for Installation of Load-Bearing (Transverse and Axial) Steel Studs and Related Accessories.

B. Gages and properties of studs shall be as indicated on Drawings.

C. Mechanical anchors to concrete and masonry shall be metal cinch at least 3/8 inch in diameter threaded bolt head type. Anchor bolts to be installed in concrete shall be hook type ½ inch diameter or more. Unless otherwise indicated.

D. Mechanical anchors to metal framing shall be No. 10 self-tapping and self-drilling wafer-head screws.

E. Accessories: Special top tracks, angles, fasteners, and strips of gypsum wallboard, as required for fire rating assembly required at each condition.

F. Mineral Wool Safing Insulation: 4.0 pcf density. Thermafiber, Fibrex, or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install plumb and true. Install necessary accessories for proper installation.

B. Anchor top and bottom runner track to ceiling or roof structure overhead and to floor structure below.

C. Install studs squarely in top and bottom runner track with firm abutment against track webs.

D. Align and plumb studs, and fasten to flanges of both top and bottom runner tracks.

E. Provide three studs minimum at corners of stud walls. Locate so as to provide surfaces for attachment of interior and exterior facing materials.

F. Members not indicated to be welded together shall be attached with manufacturer recommended screws with minimum one screw at each flange of stud to top and bottom track. Wire tying of framing members is not permitted.

G. Provide lateral bracing and bridging in accordance with manufacturer's written recommendations or as required by CBC.

H. Intersecting walls and partitions, whether load-bearing or not, shall be connected.

I. Splices in axially loaded studs are not permitted.

J. Splice or butt weld butt joints in runner tracks. No splices are permitted in tracks over lintels, diaphragm sheathing, or diagonal bracing.

K. Weld connections by fillet welds or plug welds in accordance with AWS recommended procedures and practices.

L. Touch-up field abrasions and welds with galvanizing touch-up material.

M. Studs that frame door openings shall be clipped to floor with 14 gage angle clips. Each clip to have two fasteners into studs and two fasteners into floor.

N. Provide additional joists or blocking adjacent to exterior and interior walls, openings and elsewhere as required to provide support for indicated ceiling construction.

O. Provide an additional joist under parallel partitions where partition length exceeds ½ joist span and around floor and roof openings which interrupt one or more spanning members.

3.02 CONNECTIONS TO METAL DECKING

A. Provide premolded neoprene filler strips matching flute profile for non-fire-rated walls and partitions covered on one or both sides up to metal decking.

B. Top runner track of fire-rated partitions shall be a minimum of 36 mils (20 gage), unless noted otherwise, and attached to metal deck with required fasteners at spacing required for fire rating, but in no case over 16 inches on center. Areas above runner shall be friction fit with a minimum depth of 2 ½ inches of 4 pounds per cubic foot density mineral wool insulation. A minimum of ½ inch of firestopping compound shall be installed to each side of mineral wool insulation for a one-hour system, and one inch of firestopping for a two-hour system. Install required special tracks, angles, fasteners and strips of gypsum wallboard to provide required fire resistance rating.

C. Fire-rated top tracks shall be installed in accordance with manufacturer's recommendations and fire rating approval requirements.

3.03 QUALITY CONTROL

A. Welding Inspection:

1. Inspection of field welding operations shall be performed by special inspector.

2. The special inspector shall inspect material, equipment, procedures, welds, and welder qualifications.

3.04 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.05 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION

SECTION 05 5000

METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Metal fabrications:

1. Steel pipe.

2. Square and rectangular steel tubing.

3. Pipe columns.

4. Handrails and guardrails.

5. Steel thresholds (See detail 14/A841).

6. Steel ladders.

7. Gratings, frames and covers.

8. Miscellaneous fabrications, as indicated on the Drawings.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 01 4523: Testing and Inspection.

3. Section 05 1200: Structural Steel Framing.

4. Section 08 7100: Door Hardware.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating provided materials, dimensions, anchoring detail, and details of termination or connection to adjacent construction. Indicate items that are purchased from a manufacturer and items that are shop fabricated. Indicate component parts requiring Project site fabrication or assembly.

B. Product Data: Submit Product Data for manufactured items. Submit Product Data for primers and finishes.

C. Material Samples: Submit Samples of primers and finishes on fabricated items.

D. Installation Instructions: Submit installation instructions for manufactured items.

1.03 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. Design, fabricate, and install miscellaneous metals in accordance with AISC - Design, Fabrication, and Erection of Structural Steel for Buildings.

2. AWS D-1.1 Code - Welding in Building Construction.

3. Inspection of Welding: Refer to Section 01 4523: Testing and Inspection.

4. Welding: Refer to Section 01 4523 Testing and Inspection.

B. Coordinate installation of accessory items required for metal fabrications.

1.04 DELIVERY, STORAGE AND HANDLING

A. Store miscellaneous metal items above grade on platforms, skids, or other required supports.

B. Protect from corrosion or damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Steel Shapes: ASTM A36.

B. Steel Pipe:

1. Steel pipe for pipe columns and other structural purposes shall conform to ASTM A53, Type E or S, Grade B, as required.

2. Steel pipe other than pipe furnished for structural purposes shall conform to ASTM A53.

C. Square and Rectangular Steel Tubing:

1. Steel tubing for structural purposes shall be carbon steel conforming to ASTM A500 or ASTM A36.

2. Steel tubing other than tubing furnished for structural purposes shall be hot or cold rolled carbon steel electric welded tubing.

D. Cast Steel: ASTM A27, Grade 65-35.

E. Steel Bolts: ASTM A307, Grade A, with bolt head and nut dimensions conforming to ANSI B 18.2.1.

F. Rolled Steel Plates and Shapes:

1. Shapes and plates shall conform to ASTM A36, except for plates to be bent or cold-formed.

2. Plates to be bent or cold-formed shall conform to ASTM A283, Grade C.

G. Chain: Chain shall be 4/0 double loop pattern coil chain.

H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications“Rapid set Cement”.

2.02 FABRICATION

A. General:

1. For fabrication of Work exposed to view, provide only materials smooth and free of blemishes. Remove blemishes by grinding or by welding and grinding, before cleaning, treating, and installation of surface finishes including zinc coatings.

2. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated or specified.

B. Ladder Extensions: Where vertical ladders are installed for access to roof hatches, provide the following:

1. Roof hatch ladders shall be provided with ladder extensions. Ladder extensions shall be Bilco Model 1, "LadderUP Safety Post,” Maxam Metal Products, “Spring Balance Safety Post”, or equal, on fixed ladders below roof hatches. Device shall be manufactured of high strength steel with telescoping tubular section that locks automatically when fully extended. Upward and downward movement shall be controlled by a stainless steel spring balancing mechanism. Finish shall hot dip galvanized. Unit shall be completely assembled with fasteners for securing to the ladder rungs in accordance with the manufacturer's instructions.

C. Miscellaneous Framing and Supports:

1. Except as otherwise indicated, space anchors 2 feet on center, and provide minimum anchor units of 1 ¼-inch by ¼ inch by 8-inch steel straps.

2. Shelf angles for exterior construction shall be galvanized steel of sizes indicated.

D. Welding:

1. Weld connections unless otherwise indicated.

2. Weld corners and seams continuously and in accordance with requirements of AWS Code. Welds shall be inspected as required in Section 05 1200: Structural Steel Framing.

3. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

E. Galvanizing:

1. ASTM A123, ASTM A153, or ASTM A386, as applicable, hot dip with 2.0 ounces per square foot on actual surface and 1.8 ounces per square foot minimum on any specimen, and as specified herein.

2. Galvanizing Repair Material: DRYGALV as manufactured by the American Solder and Flux Company, Galvalloy, Galvion, or equal. Hot applied repair material, or anodic zinc- rich galvanizing repair paint conforming to Mil Spec DOD-P-21035.

3. Items to be galvanized shall be hot-dip galvanized in sections as large as possible.

F. Shop Finish:

1. Metal fabrications shall be provided with a coat of primer, except those indicated to be completed with exposed galvanized finish.

2. Primers:

a. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

b. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

c. Minimum dry film thickness of primer shall be 2.0 mils.

3. Preparation for Primer Painting: Miscellaneous ferrous metal, except items specified galvanized, shall be thoroughly cleaned and prepared for painting, including removal of shipping oils or protective coatings, mill scale, grease, dirt and rust. Prepare in accordance with SSPC recommendations. Deliver to Project site primed or galvanized as indicated, and ready to receive Project site applied finishes.

4. Galvanized Metal Work to receive Paint: Clean oil, grease and other foreign materials from surfaces. Apply vinyl wash pretreatment coating. Follow manufacturer's instructions for drying time, and then prime with one coat of metal primer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Handrails and Guardrails:

1. Install standards into metal sleeves cast in concrete, and extending into it at least 9 inches. Wedge standards true, plumb, and fastened by packing with grout. Finish grout smooth and flush with adjacent surfaces.

2. Rails contacting a vertical surface shall be fitted with standard pipe rail flanges, secured to concrete or masonry surfaces with 3/8 inch 2-unit expansion anchor bolts and secured to wood frame surfaces with 3/8 inch lag screws, unless otherwise indicated.

3. Railings abutting pipe columns shall be provided with shaped end caps to fit columns welded to rails, and secured to columns with self-tapping machine screws.

B. Steel Thresholds: Fabricate channel or angle thresholds of rolled steel sections of size indicated, galvanized after fabrication. Anchor into concrete with countersunk 2-unit cinch anchor bolts, unless otherwise indicated.

C. Gratings, Frames and Covers:

1. Over areas indicated, provide steel gratings and grating frames as detailed. Frames shall have mitered and welded corners, and be fitted with anchors.

2. Provide steel checkered plate covers and steel frames for sumps, grease traps, and sand traps, and other covers for access where indicated. Frames shall be provided with mitered and welded corners and be fitted with anchors as detailed. Cover shall be perforated. Each section of access cover shall be furnished with steel pull rings and tool operated fastening device. Screws to fasten covers shall be brass.

3.02 ADJUSTING

A. Touch Up Damaged Surfaces:

1. Shop Painted Finishes: Comply with SSPC-PA-1 for touch-up; apply with brush to produce a minimum 2.0 mil dry film thickness.

2 Galvanized Surfaces: Clean field welds, connections and damaged areas. Repair galvanized finishes in accord with ASTM A780.

3.03 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 05 5133

LADDERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aluminum access ladders.

1.2 RELATED SECTIONS

A. Section 05500 – Metal Fabrications: Fasteners and installation requirements used to attach ladders to structure.

B. Section 15050 – Basic Electrical Materials and Methods: For electrical grounding of ladders.

1.3 REFERENCES

A. AA – Aluminum Association.

B. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

D. OSHA 1910.27 – Fixed Ladders.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product.

C. Shop Drawings:
   1. Detail fabrication and erection of each ladder indicated. Include plans, elevations, sections, and details of metal fabrications and their connections.
   2. Provide templates for anchors and bolts specified for installation under other Sections.
   3. Provide reaction loads for each hanger and bracket.

D. Qualification Data:
   1. Refer to Quality Assurance provisions for submittal requirements evidencing experience, certifications and resources.

E. Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors.

F. Verification Samples: For each finish specified, two samples, minimum size 6 inches (150 mm) square, represent actual product color.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in producing aluminum metal ladders similar to those indicated for this Project.
    1. Record of successful in-service performance.
    2. Sufficient production capacity to produce required units.
    3. Professional engineering competent in design and structural analysis to fabricate ladders in compliance with industry standards and local codes.

B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.

C. Product Qualification: Product design shall comply with OSHA 1910.27 minimum standards for ladders.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
    1. Install ladder in area designated by Architect.
    2. Do not proceed with remaining work until workmanship and installation are approved by Architect.
    3. Rework mock-up as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurement before fabrication.
    1. Established Dimensions: Where field measurements cannot be made without delaying the Work, indicate established dimensions on shop drawing submittal and proceed with fabrication.

1.8 WARRANTY

A. Manufacturer has responsibility for an extended Corrective Period for work of this Section for a period of 5 years from date of Final Completion against all the conditions indicated below, and when notified in writing from District, manufacturer shall promptly and without inconvenience and cost to District correct said deficiencies.
    1. Defects in materials and workmanship.
    2. Deterioration of material and surface performance below minimum OSHA standards as certified by independent third party testing laboratory. Ordinary wear and tear, unusual abuse or neglect excepted.
    3. Within the warranty period, the manufacturer shall, at its option, repair, replace, or refund the purchase price of defective ladder.

B. Manufacturer shall be notified immediately of defective products, and be given a reasonable opportunity to inspect the goods prior to return. Manufacturer will not assume responsibility, or compensation, for unauthorized repairs or labor. Manufacturer makes no other warranty, expressed or implied, to the merchantability, fitness for a particular purpose, design, sale, installation, or use, of the ladder; and shall not be liable for incidental or consequential damages, losses of or expenses, resulting from the use of ladder products.

1.9 EXTRA MATERIALS

A. Furnish touchup kit for each type and color of paint finish provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:

   A. O'Keeffe's, Inc. (basis of design); 325 Newhall St. San Francisco, CA 94124. ASD. Toll Free Tel: (888) 653-3333. Tel: (415) 824-4900. Fax: (415) 824-5900. Email: info@okeeffes.com. Web: http://www.okeeffes.com.

   B. Approved equal.

2.2 APPLICATIONS/SCOPE

A. Fixed Access Ladder:
   1. Heavy Duty Tubular Rail.
      a. Model 501 as manufactured by O'Keeffe's Inc.
      b. Model 503A Low Parapet Access Ladder with Platform as manufactured by O'Keeffe's Inc.

2.3 FINISHES

A. Mill finish. As extruded.

B. Clear Anodic Finish: AA-M10C22A41 Mechanical finish as fabricated. Architectural Class I, clear coating 0.018 mm or thicker.

C. Paint Urethane over chemically pretreated substrate: As scheduled on drawings.

2.4 MATERIALS

A. Aluminum Sheet: Alloy 5005-H34 to comply with ASTM B209.

B. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.

2.5 FABRICATION

A. Rungs: Not less than 1-1/4 inches (32 mm) in section and 18–3/8 inches (467mm) long, formed from tubular aluminum extrusions. Squared and deeply serrated on all sides.
   1. Rungs shall withstand a 1,500 pound (454 kg) load without deformation or failure.

B. Channel Side Rails: Not less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide.

C. Heavy Duty Tubular Side Rails: Assembled from two interlocking aluminum extrusions no less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.

D. Walk-Through Rail and Roof Rail Extension: Not less than 3 feet 6 inches (1067 mm) above the landing and shall be fitted with deeply serrated, square, tubular grab rails.

E. Landing Platform: 1-1/2 inches (38 mm) or greater diameter, tubular aluminum guardrails and decks of serrated aluminum treads.

F. Ladder Safety Post: Retractable hand hold and tie off.

G. Rail and Harness Fall Arrest System: Supplied where specified as alternate to safety cage and landing platforms, in accordance with OSHA regulation 1910.27; permanently mounted to ladder rungs and complete with necessary components.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance.

B. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.

C. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Final Completion.

END OF SECTION

SECTION 05 7000

FABRICATED STEEL LETTERS AND LOGOS

PART 1 – GENERAL

1.1 SCOPE

A. Furnish Letters/Logos and hardware necessary to install Fabricated Steel shown on drawings and herein specified.

1.2 SUBMITTALS

A. Manufacturer’s illustrated product literature and specifications.

B. Submit shop drawings, seaming details, and manufacturer's technical data, installation and maintenance instructions.

1.3 QUALITY ASSURANCE

A. Manufacturer to have a minimum of 20 years experience in manufacturing letters.

B. All letters to be manufactured by one manufacturer.

C. Mock-ups: Install at the project site a job mock-up using acceptable products and manufacturer approved installation methods and as shown on Structural drawings (including top and bottom attachment details). Obtain Architect’s acceptance of finish color, texture and pattern, and workmanship standards.

1. Mock-Up Size: 5’-6” tall minimum.

2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required

PART II – PRODUCTS

2.1 ACCEPTABLE MANUFACTURER or MANUFACTURER’S REPRESENTATIVE

A. Sign Zone LA

4873 Melrose Ave., Los Angeles, CA 90029

Contact: Chris Nalbandian

Phone: 323-465-8200

Email: support@signzonela.com

Web: www.signzonela.com

2.2 MATERIALS

A. High-Grade, Powder-Coated Steel

1. Color as shown on drawings or per Architect’s direction.

2.3 GENERAL CONSTRUCTION

A. Material: Fabricated channel letters up to 11’ are produced from 3/4" thick steel

B. Cutting: Computer guided lasers cut letters, logos or shapes.

C. Construction: Any intermediate welding of letters shall be ground completely smooth and flush. Final letter is to appear seamless after powder coating has occurred. Letter edges shall also be ground smooth and shall be free of burrs and defects before powder coating has occurred.

D. Testing: Solder joints indicate the ability to withstand temperatures from -40ºF to 220ºF. Salt Fog tested to ASTM B- 117-95 for corrosion resistance.

E. Finishes: All Fabricated Steel letters are laser cut from pre-finished Steel

F. Edges: The edges of all letter faces will be powdered coated steel.

2.4 FINISH OPTIONS

A. Steel

1. Painted finish: primed then sprayed with 2-part hardened acrylic polyurethane paint, oven baked.

2. Protective coating: protective clear coat to be applied over painted finish

2.9 MANUFACTURE

A. Letters:

1. Font: Univers 55, Bold, Italic

2. Height: As indicated on drawings

3. Depth: As indicated on drawings

PART III – EXECUTION

3.1 INSTALLATION

A. A qualified installer shall install fabricated letters.

3.2 WARRANTY

A. Letters should be guaranteed for the life of the business against structural defects.

3.3 MAINTENANCE

A. Cleaning of Letters/Logos as needed, per manufacturer’s recommendations.

3.4 PROTECTION

A. Protect installed letters against damage due to ongoing construction activities. Any damage to the letters that occurs before the project is complete shall be repaired (or letter(s) replaced if deemed necessary by Owner or Architect) at no additional cost to the owner.

END OF SECTION

SECTION 06 4000

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 1 - General Requirements apply to this section.

B. Section Includes:

1. Architectural woodwork, casework, trim, hardware, countertops and shelving as indicated on Drawings.

C. Related Sections:

1. Section 09900: Paints and Coatings.

1.02 SECTION DEFINITIONS

A. "FSC wood" is defined as "wood that is harvested from forests that are determined by third parties to meet the ten FSC principals and criteria. These include managerial aspects as well as environmental and social requirements for forest management".

1.03 SYSTEM DESCRIPTION

A. Design Requirements: Provide wood products from certified sustainably harvested sources.

1.04 SUBMITTALS

A. Submit required data in accordance with Section 38 of the Construction Services Agreement.

B. Shop Drawings: Submit Shop Drawings of casework indicating materials and hardware, details of construction, dimensions, methods of fastening and installation details. Shop Drawings shall bear a WI Certified Compliance Label indicating that Shop Drawings fully meet requirements of WI grade specified. Shop Drawings shall indicate grounds, backing, blocking, sleepers and other items required for installation of casework, which are to be provided and installed as part of the Work.

C. Certificates: Provide WI Certified Compliance Certificate certifying that materials, fabrication and installation will comply with the specified requirements.

D. Provide Manufacturer’s specifications confirming that their products contain no–added formaldehyde based resins shall be provided for all wood and agrifiber products including hardwood plywood, plywood with decorative softwood veneer, laminated products with a composite wood core or platform, particleboard, medium density fiberboard (MDF) and finished goods fabricated from these products (e.g., doors, trim or molding, cabinetry, counter tops).

E. Material Samples: Submit 2 inch x 3 inch plastic laminate color samples as specified in Architectural drawings.

F. Closeout Submittals: Provide FSC Chain of Custody paperwork for all wood based products.

1.05 QUALITY ASSURANCE

A. Comply with WIC Manual of Millwork, grades as specified herein.

B. Each elevation of casework shall bear WI Certified Compliance Label indicating that casework fully meets requirements of WIC grade specified.

C. Each plastic laminate countertop shall bear WIC Certified Compliance Label indicating tops fully meet requirements of WI grade specified.

D. Mock-ups: When required by the Architect, submit a full-scale base cabinet, countertop, and wall-hung cabinet, illustrating joinery and plastic laminate finish. Base cabinet shall incorporate a drawer, an adjustable shelf, and a door. Wall-hung cabinet shall incorporate 2 doors, one adjustable shelf and finished end, including required hardware.

E. 50% of all wood based products in project (by cost) shall be FSC certified.

1.06 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the Project site in undamaged condition, stored in fully covered, well ventilated areas, and protected from extreme changes in humidity and temperature. Refer to WIC Manual for recommended care and storage.

B. In event of damage immediately furnish necessary repairs or replacements.

1.07 PROJECT CONDITIONS

A. Store indoors, in ventilated areas with constant but minimum temperature of 60 degrees F. and maximum relative humidity of 25 percent to 55 percent. At least seven days before installation, maintain temperature of 70 degrees F. and relative humidity of 50 percent to 55 percent. Acclimate materials to the installation temperature and humidity for at least 72 hours prior to installation. Maintain conditions until Final completion.

1.08 WARRANTY

A. Provide a two year unconditional installation warranty commencing on the recorded date of the Notice of Completion in accordance with Section 21 of the Construction Services Agreement.

B. Provide an end of warranty walk with the District prior to the end of the warranty period.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General

1. All panel products (plywood, hardboard, MDF etc.) shall be manufactured with no added urea formaldehyde. All finish lumber shall be Kiln dry.

2. Adhesives

a. Shall be Type 1, except at wet areas where Type 2 shall be used.

b. Urea formaldehyde based adhesives shall not be used.

c. Contact cement shall have a VOC content that meets the requirements of the current SCAQMD Rule 1168.

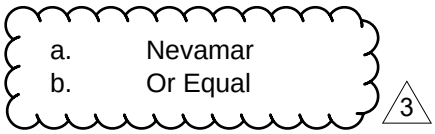
d. Construction adhesive shall have a VOC content that meets the requirements of the current SCAQMD Rule 1168.

3. Stains and finishes shall comply with the requirements of the current SCAQMD Rule 1168.

B. Plastic Laminate Faced Cabinets:

1. Plastic laminate: High pressure plastic laminate conforming to NEMA standard LD-3; 0.050 inches at horizontal surfaces, 0.028 inches at exposed vertical surfaces and edge bands, and 0.042 inch minimum for post-formed countertops.

a. Nevamar
b. Or Equal



2. Solid Lumber:

a. Solid lumber for exposed members, drawers, trays and special details shall be Clear birch or maple.

b. Unexposed solid lumber for concealed webs or structural members shall be of Clear Douglas fir.

3. Softwood Plywood: Rotary cut exterior type A-C grade softwood plywood complying with PS1.

4. Hardboard: Factory finished pressure sealed hardboard conforming to the requirements of PS 58. Oil tempered hardboard shall conform to CS 251.

5. Cabinet Liner: Semi-exposed surfaces shall be finished with 0.020 inch high-pressure laminate cabinet liner, conforming to NEMA Standard LD-3.

6. Edge Banding:

a. T-type extruded tenite-butyrate 1/16 inch minimum thickness, with serrated leg 3/8 inch in length.

b. 0.028 inch minimum thickness plastic laminate.

7. Glass Doors: 1/4 inch laminated safety glass.

8. Adhesive: Type II water-resistant, rigid type glue of formula conforming to PS 51.

9. Sealer: Thompson Water Seal 101 or Watco Oil.

11. Base: Cover toe spaces with typical wall base unless otherwise indicated.

C. Wood Casework:

1. MDF: With 80% total recycled content. 45 lb. density, conforming to ANSI A-208.1, table 1, Grade 1-M-2.

2. Solid Lumber:

a. Concealed portions: Any species of sound, dry, solid stock.

b. Semi-exposed portions: Custom Grade hardwood veneer of the same species as exposed material with a specific gravity in excess of 0.37.

c. Exposed portions: Premium Grade well matched for color and grain, select white birch veneer.

3. Hardboard: Factory finished, pressure sealed hardboard conforming to requirements of PS 58.

4. Edge Banding: Same species of wood as adjacent to exposed surfaces.

5. Shelving: All shelving to be ¾" plywood core.

D. Hardware:

1. Drawer Glides:

a. Drawers and box drawers, up to 24 inches wide: Accuride 3640A.

b. Lateral file drawers, up to 30 inches wide: Accuride 4034 overetravel or 4033 equal travel.

3. Mutes: Rubber, approximately 1/4 inch diameter, colors to match adjacent finish.

4. Plastic Grommets: Doug Mockett, or equal; color as selected by Architect.

5. Adjustable Shelves with Clips: Adjustable shelf supports (EDP type, unless otherwise noted) set in 5 mm holes spaced 32 mm on center:

a. Hafele America, Co., No. 282.04.711.

b. Hafele America, Co., No. 282.24.13.

6. Cabinet Hinges: heavy duty, 5 knuckle institutional hinge; mill ground with hospital tips

   a. RPC No. 376 or equal.

7. Cabinet Locks:

   a. Door Locks: Pin tumbler type – National No. 3713 x 2475-172 strike or Olympus 100DR x 12-1 strike.

   b. Locks for Sliding Doors: National No. C8142 x thimble strike or Olympus 300 SD x thimble strike.

   c. Drawer Locks: National 68-3718 x 68-2480C brass strike or Olympus 200 DW x 12-1 strike.

   d. Cabinet locks shall be flush with surface of door and protrude no greater than 3/16".

8. Top-hung Hardware Assembly for Sliding Doors: Grant No. 6064.

9. Track for Sliding Doors: K & V 455 x or 455.55.

10. Pull Flush Ring at Drawers behind Doors: Safe No. 6116 or BBW 24.

11. Pulls: Provide U-Pulls at all cabinets. BBW No. 79P, Quality No. 179 x 180 or Trimco No. 553P.

12. Catches: Magnetic type - Epco No. 592 or Lawrence No. SC1364-AL.

13. Four-way Tension Catch: Glynn-Johnson GJ21A.

14. Noiseless Catch: Hardware Specialties 11687-FW7.

15. Elbow Catch: Ives 2A.

16. Bolts: Surface type BBW No. 97-B6, Quality B6 or Trimco No. 4856-6.

17. Brackets and Shelf Strip for Glass Shelves: K & V No. 80 x 180 or Garcy 604 x 686.

18. Shelf Standards and Brackets: K & V No. 255 x 256 or line bored holes for pins as approved by WIC standards Stanley No. 798 x 799, steel zinc plated.

19. Card Holders for Drawers: Corbin No. 1913-1/4H or Garcy No. 853.

20. Hanger Rods: 1-1/16 inches minimum diameter metal tubing, aluminum or stainless steel clad, KV660; heavy wall steel tubing KV770.

21. Hanger Rod Flanges: KV757, or flanges KV734, KV735; Ronther Reiss R44-55; or equal.

22. Hardware Finish: With exception of finish hardware items which have finishes specified, hardware shall be furnished with dull chrome US 26D or dull stainless steel US 32D finish.

23. Keying:

a. Key locks inside one room alike. Furnish 3 keys for each lock keyed separately, and 2 keys for each lock in keyed alike groups. Master keys shall be tagged and delivered to the IOR. Locks and keys shall be stamped with coded set number / direct digit.

b. Cabinet locks shall be master-keyed and keyed alike. Backside of cabinet lock bolts (on visible side following installation) and change keys shall be stamped with manufacturer's code, either direct digit or coded series. Change keys shall also be stamped with set numbers direct digit.

c. Master keys shall be National GM2 △3

E. Solid Surface Counters:

1. Solid Surface: Cambria, Whitney 01115, 3/4" thick.
2. Base: 3/4" exterior grade plywood.

2.02 FABRICATION

A. Plastic Laminated Casework: Construction of plastic laminated casework shall conform to the material and construction requirements for WIC Custom grade flush overlay construction.

1. Exposed Vertical Panels and Doors: Exposed fixed panels and doors, including exposed ends of cabinets and both ends of each cabinet shall be 3 ply laminate construction consisting of plastic laminate with particle board and a balancing sheet, bonded together under pressure with adhesive. Total nominal thickness of panels and doors shall be 0.75 inch unless otherwise indicated.

2. Exposed bottom of wall-hung cabinets shall be furnished with plastic laminate finish.

3. Semi-exposed Panels: Interior panels, bottoms, and tops shall be 3/4 inch particleboard minimum. Bottoms of upper cabinets spanning 42 inches or more shall be one inch thick.

4. Webs: Stiles, rails and muntins of web frame shall be tongue and grooved at joints and glued. Top and bottom rails shall be continuous. Use of 8 mm wooden dowels, screws or biscuits shall be in accordance with WIC Standards.

5. Cabinet bases may be integral or separate. Bases shall be 3/4 inch thick plywood securely jointed at 4 corners to a supporting block 1-1/2 inches thick.

6. Ends: Cabinet ends shall be minimum 3/4 inch thick, lock-jointed, doweled, glued, and screwed to webs or top and bottom of the cabinet.

7. Backs shall be 1/4 inch thick plywood or 1/4 inch thick particle board, and shall be plowed into sides and top (except countertops) glued and nailed on 4 inch centers. Back shall be braced with horizontal 3/4 inch x 3-1/2 inch backing strips on 3 feet centers maximum. Cabinets with exposed finish backs shall have 3/4 inch backs of laminate construction. Where exposed finished cabinet end and back form an external corner, plastic laminates shall meet at corner.

8. Adjustable shelving shall be 3/4 inch thickness particleboard for spans up to 25 inches and one inch thickness for spans over 25 inches up to 34 inches. Adjustable shelving over 34 inches in span shall be one inch thick plywood core with 0.020 inch cabinet liner both sides. Shelving hardware shall be adjustable to one inch centers. Faces and edges of shelving shall be finished with 0.020 inch thickness cabinet liner both sides.

9. Drawers:

    a. Sides, backs, and sub-fronts of drawers shall be of dovetail or dowel construction and made of 1/2 inch thick clear birch or maple solid stock. Drawer bottoms shall be in accordance with WIC requirements, glue blocked and nailed.

    b. Drawers shall be fitted with ball bearing slides accurately installed for smooth drawer operation.

    c. Drawer fronts shall be of 3/4 inch thick plastic laminate construction, fully edge-banded with plastic laminate T-banding to be used when matching existing. T-banding joint shall occur at center of bottom edge of panel.

10. Doors:

    a. Doors shall be of overlay type with flush exposed surfaces. Doors shall be fully edge-banded with plastic laminate. Joint in banding shall occur at center of bottom edge. Doors of cabinets within any group of adjacent units shall be in alignment.

    b. Hinges shall be routed into edge of door. Doors over 40 inches in height shall have 3 hinges.

11. Back Priming: Seal unfinished materials installed for backs, bases, self-edge backing, stripping and other concealed portions with a water-repellent sealer.

12. Banding:

    a. Exposed edges of interior and exterior laminates shall be edge banded with plastic laminate. Edge banding shall be provided in longest available lengths.

    b. Edge banding shall be accurately fitted. Where edge band joins plastic surfaces, there shall be no open spaces, voids, or chipping of plastic laminate surface.

c. Exposed cabinet surfaces shall be flush, and any protruding edges of banding shall be machined or trimmed to provide a flat smooth corner at intersection of banding and adjoining surfaces. Plastic laminate edge banding shall be installed on tops, webs, bottoms, ends and inside partitions. T banding may only be installed on drawer fronts and door edges and only as required to match existing.

B. Wood Casework: Manufacture in accordance with WIC Manual of Millwork, Premium Grade, except, modified as follows:

1. Casework bodies shall be 3/4 inch thick particleboard core. Particleboard core shall have a minimum density of 45 pounds.

2. Exposed surfaces for transparent finish shall be plain sliced select white birch, and shall be Premium Grade veneers and solid stock.

3. Semi-exposed surfaces shall be natural birch Good Grade veneer. Semi-exposed portions behind glass or in open cases shall be of same species and grade as exposed portions.

4. Edge banding shall be wood edge bands of same species as adjacent exposed faces.

5. Cabinet doors shall be particleboard core a minimum of 3/4 inch thickness, unless otherwise noted. Interior faces of cabinet doors shall be same species and grade as exposed surfaces. Cabinet doors shall be flush overlay type No. 1.

C. Countertops:

1. Plastic Laminate Tops: Each plastic laminate countertop shall bear the WIC Certified Compliance Label.

a. Laminated plastic countertops shall be self-edged, except that plastic countertops containing sink cutouts shall have a no-drip tilt-front edge. Edge shall rise 1/8 inch above counter surface and back and return splashes shall be 6 inches high measured from exposed countertop surface, unless otherwise indicated.

b. Cove and roll front sticking, for plastic laminate back-up, shall be kiln dried clear sugar pine glued to core material. Cove sticking shall be secured in each direction with 2-1/2 inch long wood screws, 3 inches from each end and 10 inches on center.

c. Splash shall be end applied and be set in mastic and secured to top with screws 8 inches on centers. Splash edges shall be self-edged and scribed to wall.

d. Joints shall be splined and fastened with screw clip fasteners on at least 8 inch centers. Water resisting mastic or glue shall be applied in joints. Joints shall not occur at sink cutouts. Sink cutouts shall be sealed.

e. Core material for counters and splashes shall be 3/4 inch thick, 7-ply, rotary cut Philippine mahogany 2-4 faces, type 1, or 3/4 inch 1-M-2 grade particleboard.

f. Metal sink moldings shall be stainless steel, Hudee, Kintrim T-Type or Chromedge Sink-Lok, with bolts and lugs.

g. Mastic: Metal trim shall have a continuous layer of mastic in voids between metal and plywood and sink. Counter cutout edge shall be waterproofed to prevent delamination of countertop. Metal trim shall be applied over finished plastic surfaces without kerfing or routing of molding.

h. Installation of plastic laminate shall be in accordance with published specifications and recommended practices of the plastic laminate manufacturer.

2.03 FINISHING

A. Exposed hardwood parts shall be finished with one coat of clear sealer and 2 coats of finish sealer. Unexposed materials such as backs, webs, back of tops, and the like, shall be sealed with one oil base prime coat. Semi-exposed wood surfaces such as drawer interiors shall be finished with one coat of sanding sealer and one coat of clear gloss sealer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install Work of this section as specified in the WIC Manual of Millwork.

B. Cabinets: Install cabinets level, plumb, and secure to walls. Exposed screws shall have finish washers.

C. End Panels and Fillers: Furnish to match exposed surfaces and accurately scribe to walls and neatly and securely fit to cabinets.

D. Completion: Upon completion of installation, cabinets including drawers and shelves shall be cleaned. Doors and drawers shall operate easily and freely.

E. Scribe plastic laminated cabinets to walls. Installation of surface-applied moldings is not permitted.

F. All joints to be beveled. No butt joints.

3.02 CLEAN UP

A. Remove debris, rubbish and waste material and legally dispose of off the Project site.

3.03 PROTECTION

A. Protect the Work of this section until Final Completion.

END OF SECTION

3

SECTION 07 1325

SELF-ADHERING SHEET WATEPROOFING - BUILDING

BITUTHENE® 3000 Membrane & BITUTHENE® Low Temperature Membrane

PART 1 — GENERAL

1.01 SUMMARY

A. The work of this section includes, but is not limited to, the following:
   1. Rubberized asphalt sheet membrane waterproofing
   2. Prefabricated drainage composite
   3. Protection board

B. Related Sections: Other specification sections which directly relate to the work of this section include, but are not limited to, the following:
   1. Section 033000 – Cast-In-Place Concrete
   2. Section 042000 – Unit Masonry
   3. Section 076000 – Flashing and Sheet Metal
   4. Section 079200 – Joint Sealants

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations. Include certification of data indicating VOC (Volatile Organic Compound) content of all components of waterproofing system.

B. Samples: Submit representative samples of the following for approval:
   1. Sheet membrane
   2. Protection board
   3. Prefabricated drainage composite

1.03 REFERENCE STANDARDS

A. The following standards and publications are applicable to the extent referenced in the text.

B. American Society for Testing and Materials (ASTM)
   - C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
   - D 412 Standard Test Methods for Rubber Properties in Tension
   - D 570 Standard Test Method for Water Absorption of Plastics
   - D 882 Standard Test Methods for Tensile Properties of Thin Plastic Sheeting
   - D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
   - D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)
   - D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
   - D 3767 Standard Practice for Rubber - Measurements of Dimensions
   - D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
   - E 96 Standard Test Methods for Water Vapor Transmission of Materials
   - E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

1.04 QUALITY ASSURANCE

A. Manufacturer: Sheet membrane waterproofing shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of self-adhesive sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.

B. Installer: A firm which has at least 3 years experience in work of the type required by this section.

C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.

D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.

1. Do not double-stack pallets of membrane on the job site. Provide cover on top and all sides, allowing for adequate ventilation.

B. Sequence deliveries to avoid delays, but minimize on-site storage.

C. Safety and Handling

Users must read and understand the product label and Safety Data Sheets (SDS's) for each system component before use. All users must acquaint themselves with this information prior to working with the material. Carefully read detailed precaution statements on the product labels and SDS's before use.

1.06 PROJECT CONDITIONS

A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.

B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

1.07 WARRANTY

A. Sheet Membrane Waterproofing: Provide written 5 year material warranty issued by the membrane manufacturer upon completion of the work.

PART 2 — PRODUCTS

2.01 MATERIALS

A. Sheet Membrane Waterproofing: BITUTHENE® 3000 Membrane/Low Temperature Membrane as manufactured by GCP Applied Technologies; a self-adhesive, cold-applied composite sheet consisting of a thickness of 1.4 mm (0.056 in.) of rubberized asphalt and 0.1 mm (0.004 in.) of cross-laminated, high density polyethylene film. Provide rubberized asphalt membrane covered with a release sheet, which is removed during installation and no special adhesive or heat shall be required to form laps. Provide membrane with the following physical properties:

PHYSICAL PROPERTIES: BITUTHENE® 3000 Membrane & BITUTHENE® LOW TEMPERATURE Membrane

Property	Test Method	Typical Value
Color		Dark gray-black
Thickness	ASTM D 3767 Method A	1.5 mm (0.060 in.) nominal
Flexibility, 180° bend over 25 mm (1 in.) mandrel at -32°C (-25°F)	ASTM D 1970	Unaffected
Tensile Strength, Membrane Die C	ASTM D 412[1]	2240 kPa (325 psi) minimum
Tensile Strength, Film	ASTM D 882[1]	34.5 MPa (5,000 psi) minimum
Elongation, Ultimate Failure of Rubberized Asphalt	ASTM D 412[1]	300% minimum
Crack Cycling at -32°C (-25°F), 100 Cycles	ASTM C 836	Unaffected
Lap Shear	ASTM D 1002[2]	89 N (20 lbs) minimum
Peel Strength	ASTM D 903	1576 N/m (9 lbs/in.) minimum
Puncture Resistance, Membrane	ASTM E 154	222 N (50 lbs) minimum
Resistance to Hydrostatic Head	ASTM D 5385	>70 m (>230 ft) of water
Permeance	ASTM E 96, Section 12 – Water Method	<0.1 perms
Water Absorption	ASTM D 570	0.1% maximum

Footnotes:

1. *The test is run at a rate of 50 mm (2 in.) per minute.*
2. *The test is run at a rate of 102 mm (4 in.) per minute*

2.02 Ancillary Products – (reference gcpat.com for complete technical details)

A. Prefabricated Drainage Composite: HYDRODUCT® 220 and/or HYDRODUCT® 660 Drainage Composite as manufactured by GCP Applied Technologies to promote positive drainage while serving as a protection course.

B. Protection Board:

1. Expanded Polystyrene Protection Board: 25 mm (1 in.) thick for vertical applications with the following characteristics. Adhere to waterproofing membrane with BITUTHENE®Protection Board Adhesive.
   i. Normal Density: 16 kg/m^3 (1.0 lb/ft^3)
   ii. Thermal Conductivity, K factor: 0.24 at 5°C (40°F), 0.26 at 24°C (75°F)
   iii. Thermal Resistance, R-Value: 4 per 25 mm (1 in.) of thickness.
2. Asphalt Hardboard: A premolded semi-rigid protection board consisting of bitumen, mineral core and reinforcement. Provide 3 mm (0.125 in.) thick hardboard on horizontal surfaces not receiving steel reinforced slab. Where steel reinforcing bars are to be used, apply two layers of 3 mm (0.125 in.) thick hardboard or one layer of 6 mm (0.25 in.) thick hardboard.

C. Waterstop: Adcor™ hydrophilic waterstop as manufactured by GCP Applied Technologies for non-moving concrete construction joints.

D. Miscellaneous Materials: Surface conditioner, mastic, liquid membrane, tape and accessories specified or acceptable to manufacturer of sheet membrane waterproofing.

PART 3 — EXECUTION

3.01 EXAMINATION

A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 SUBSTRATE PREPARATION

A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods which are acceptable to manufacturer of sheet membrane waterproofing.

B. Cast-In-Place Concrete Substrates:

1. Do not proceed with installation until concrete has properly cured and dried (minimum 7 days for normal structural concrete and minimum 14 days for lightweight structural concrete).
2. Fill form tie rod holes with concrete and finish flush with surrounding surface.
3. Repair bugholes over 13 mm (0.5 in.) in length and 6 mm (0.25 in.) deep and finish flush with surrounding surface.
4. Remove scaling to sound, unaffected concrete and repair exposed area.
5. Grind irregular construction joints to suitable flush surface.

C. Masonry Substrates: Apply waterproofing over concrete block and brick with smooth trowel-cut mortar joints or parge coat.

D. Wood Substrates: Apply waterproofing membrane over securely fastened sound surface. All joints and fasteners shall be flush to create a smooth surface.

E. Related Materials: Treat joints and install flashing as recommended by waterproofing manufacturer.

3.03 INSTALLATION

A. Refer to manufacturer's literature for recommendations on installation, including but not limited to, the following:

1. Apply primer at rate recommended by manufacturer. Recoat areas not waterproofed if contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of primer.
2. Delay application of membrane until primer is completely dry. Dry time will vary with weather conditions.
3. Seal daily terminations with troweled bead of mastic.

4. Apply protection board and related materials in accordance with manufacturer's recommendations.

3.04 CLEANING AND PROTECTION

A. Protect completed membrane waterproofing from subsequent construction activities as recommended by manufacturer.

B. Inspect for damage just prior to installation of subsequent construction activities and make repairs in accordance with manufacturer's recommendation.

END OF SECTION

SECTION 07 1326

SELF-ADHERING SHEET WATERPROOFING

3

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Sheet waterproofing in locations indicated including:

1. Sheet waterproofing in planters.

2. Protection boards.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 03 3000 - Cast-In-Place Concrete.

3. Section 04 2200 - Concrete Unit Masonry.

1.02 SUBMITTALS

A. Certificates: Submit a certificate stating applicator is certified by the waterproofing material manufacturer and, upon completion, submit a certificate stating that waterproofing systems have been installed in conformance with reviewed submittals and manufacturer's recommendations.

B. Product Data: Submit manufacturer's Product Data including complete installation instructions.

C. Shop Drawings: Submit Shop Drawings indicating each condition of the Work. Indicate all adjoining Work, and indicate methods of adhesion and attachment, laps, and related conditions.

D. Samples: Submit Samples, not less than 12-inch square, of each type of composite sheet membrane, mounted on plywood. Submit 12-inch square Samples of each type of drainage and protection board.

E. Experience Record: Submit a list of at least five installations on which each of the materials and systems proposed for installation have been in satisfactory service for at least three years.

1.03 QUALITY ASSURANCE

A. References:

1. ASTM D6506 - Standard Specification for Asphalt Based Protection for Below-Grade Waterproofing.

2. ASTM D6135 - Standard Practice for Application of Self-Adhering Modified Bituminous Waterproofing.

3. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

4. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

B. Qualifications of Manufacturer: Sheet membrane waterproofing system shall be manufactured by a firm with a minimum of 20 years experience in the production of self-adhesive sheet membrane waterproofing.

C. Qualifications of Installer: A firm which has at least three years experience in work of the type required by this section, and is recommended by manufacturer to install the specified products.

D. Pre-Installation Conference and Inspection: After review of submittals but before starting installation of the Work of this section, conduct a meeting at the Project site attended by the Project Inspector, Architect, OAR, Contractor waterproofing applicator and a technical representative of the waterproofing material manufacturer. The waterproofing applicator and material manufacturer's technical representative shall inspect the substrates to receive Work of this section and report defective conditions to Project Inspector, Architect, OAR and Contractor.

E. Manufacturer's Representative: Provide arrangements necessary to have a trained representative of the manufacturer visit the Project site on a weekly basis during membrane waterproofing Work to review installation procedures.

F. Materials shall comply with current State of California and local Air Quality Management District requirements for volatile organic compounds of not over 350 grams per liter.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's unopened packages fully identified with manufacturer's name, trade name, type, class and grade. Each package shall be identified with material name, date of manufacturer and batch number.

B. Store materials at the Project site under cover and maintain in dry condition. Protect from damage from excessive temperature and construction operations. Do not double-stack pallets of membrane. Protect mastic and adhesive from moisture and excessive heat.

C. Store drainage composite or protection board flat and above grade. Provide cover on top and all sides of pallets and provide for adequate ventilation. Protect surface conditioner from freezing.

1.05 PROJECT CONDITIONS

A. Install suitable impervious type masking to preclude staining of surfaces to remain exposed wherever waterproofing abuts or laps on to other finish surfaces, and provide additional protection as necessary to supplement masking; cover entire area of building subject to damage or staining.

B. Protect adjacent Work during installation of Work of this Section.

C. Apply sheet waterproofing materials only in dry weather and when outside temperature is within the limits established by the manufacturer of the materials and products used.

D. Do not apply sheet waterproofing materials to damp or wet surfaces unless specifically approved in writing by manufacturer.

1.06 WARRANTY

A. Manufacturer shall provide a five year material warranty.

B. Installer shall provide a five year labor warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Sheet waterproofing shall be as manufactured by:

1. W.R. Grace & Co., W.R. Meadows, Inc.

2. Protecto Wrap Company.

3. Siplast.

2.02 MATERIALS

A. Sheet waterproofing material shall be self-adhesive, cold-applied such as W.R. Grace Bituthene 4000, W.R. Meadows Mel-Rol, Protecto Wrap PW 100/60, or equal. The material shall be a self-adhesive, cold-applied composite sheet consisting of a thickness of 0.056 inches of rubberized asphalt and 0.004 inches of cross-laminated, high density polyethylene film specially formulated for use with water-based surface conditioner. Provide rubberized asphalt membrane covered with a release sheet, which is removed during installation. No special adhesive or heat shall be required to form laps.

B. Surface conditioner: Latex based surface conditioner as recommended by manufacturer

C. Adhesives fillets and sealers: Types as recommended by manufacturer for installation with specified membrane sheet.

D. Protection board shall be 1/8 inch thick complying with ASTM D6506, semi-rigid sheets of fiberglass or mineral-reinforced asphaltic core, pressure laminated between two asphalt-saturated fibrous liners.

E. Termination Bars: Plastic, preformed as recommended by manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect and verify condition of substrates and related Work, in the presence of the manufacturer's technical representative. Do not start installation of membranes until defects in substrates have been corrected. Concrete shall be smooth, dry, and free of voids. Masonry shall have a parge coat applied.

3.02 APPLICATION OF MEMBRANE IN PLANTERS

A. Surface Conditioning: Install surface conditioner and allow to dry to surfaces to be covered with membrane the same day.

B. Corner Treatment: Pretreat inside corners with liquid membrane compound, to form a fillet or use formed reinforcement fillet recommended by manufacturer. Smooth all surfaces of outside corners.

C. Horizontal Surfaces: Install nine inch wide strips of membrane material over construction joints, cracks, and grouted joints. Seal expansion joints as recommended by manufacturer. At drains and vertical projections, install two layers of membrane sheet extended out not less than 6 inches in all directions, and seal. At drains, extend the membrane into the clamping ring and seal. Over prepared surfaces install membrane in one layer and roll into place. Lap sheets 2-1/2 inches at edges and ends.

D. Vertical Surfaces: Install membrane vertically in heights to 8 feet. Lap seams 2 ½ inches. Roll membrane with hand roller. Extend membrane to within 2" of top of planter walls and secure with termination bar.

3.03 PROTECTION BOARD

A. Cover all surfaces, vertical and horizontal, with protection board, unless indicated otherwise. Install with adhesive recommended by manufacturer, and compatible with membrane materials.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.05 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 07 2100

THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Thermal batt insulation for exterior walls and under roof decks.

2. Extruded polystyrene board insulation under roofs decks.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 09 2423 – Portland Cement Plaster

3. Section 09 2216 – Non-Structural Metal Framing

4. Section 09 8100 – Acoustical Insulation.

1.02 SUBMITTALS

A. Product Data:

1. Material List: Provide a list of materials for installation under this section.

2. Provide manufacturer's printed Product Data for each type insulation and accessory.

B. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

C. Certification: Provide certification that insulation materials conform to requirements of CBC Chapter 26.

D. Recycled Content: Provide certification that insulation materials contain a minimum 30 percent recycled materials.

1.03 QUALITY ASSURANCE

A. Surface Burning Characteristics: Flame spread rating shall not exceed 25 and smoke density shall not exceed 50 when tested in accordance with ASTM E84.

B. Combustion Characteristics: Rated as non-combustible when tested in accordance with ASTM E136.

C. Comply with following as a minimum requirement:

1. ASTM C209 – Standard Test Methods for Cellulosic Fiber Insulating Board.

2. ASTM C553: Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

3. ASTM C578: Specification for Rigid, Cellular Polystyrene Thermal Insulation.

4. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.

5. ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

6. ASTM D1622 – Standard Test Method for Apparent Density of Rigid Cellular Plastics.

7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

8. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site and store in a safe, dry place, with labels intact and legible at time of installation.

B. Protect building insulation materials from damage.

1.05 PROJECT CONDITIONS

A. Avoid exposure to humidity and moisture. Protect from exposure to sunlight.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Owens Corning.

B. Johns Manville.

C. CertainTeed Corporation.

D. The DOW Chemical Company.

E. DiversiFoam Products.

F. Equal.

2.02 MATERIALS

A. General:

1. Provide batt insulation with integral vapor barrier at all exterior walls.

2. Provide batt insulation with integral vapor barrier below roof/above ceilings, where indicated.

3. Provide Extruded-Polystyrene (XPS) board insulation at exterior walls where indicated on drawings.

4. Recycled content shall be a minimum of 30 percent.

B. Mineral Fiber Batt Insulation:

1. Faced Mineral Fiber Batt Insulation: Provide mineral fiber batts with vapor barrier consisting of mineral fibers, glass or slag, and thermosetting resins complying with ASTM C665, Type III, Class A, with vapor-retardant membrane facing.

2. R Value:

a. Batt insulation for exterior walls shall be 6 inch minimum with an R-Value of R-19.

b. Batt insulation for placement below roofs shall be 8.25 inch minimum with an R-Value of R-30.

C. Extruded-Polystyrene (XPS) Board Insulation: ASTM C578, Type X, thickness as indicated on drawings.

1. Manufacturers:

a. DiversiFoam Products, Certifoam.

b. Dow Chemical Company, Thermax.

c. Owens Corning, Foamular.

d. Equal.

2. Physical Properties:

a. Density, ASTM D1622: Not less than 1.35 pounds per cubic foot.

b. Surface Burning Characteristics, ASTM E84: Flame spread less than 25, smoke developed no greater than 50.

c. Compressive Strength, ASTM D1621: 25 psi minimum.

d. Thermal Resistance, ASTM C1363: R 5 minimum per inch of thickness with a total R-Value of 30 when installed below roofs.

e. Water Vapor Transmission, ASTM E96: Less than 0.03 perms.

f. Water Absorption by Volume, ASTM C209: Maximum 0.10 percent.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine Work to verify suitability to receive insulation. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:

1. Fit batt insulation, of R-value indicated on Drawings, snugly between framing members.

2. Maintain total insulation integrity over entire area to be insulated, including areas between closely spaced members.

3. Extend full thickness insulation over entire area to be insulated. Furnish manufacturer's recommended clips to tightly fit batts at joints.

4. Cut and fit batt insulation tightly around pipes, conduits and penetrations.

5. Do not compress batt insulation in excess of 10 percent (R-19 may be installed in 2 by 6 stud walls).

6. Prevent batt insulation from sagging during and after installation by installing adequate wire.

7. Where vapor barrier is provided, install with vapor barrier facing room.

    a. Batts in Horizontal or Sloped Applications: Provide tightly stretched string wires along center of horizontal or sloping batts where support spacing exceed 16 inch on centers.

    b. Batts in Ceiling Framing: Install batts between joists, so top of insulation is level with top of framing members. Do not install insulation over recessed lighting fixtures, speakers, or other heat producing elements in ceilings. At junction boxes, access panels, and other items requiring access from above or below ceiling, cut insulation on each side to fit item and install loosely on top. Fit insulation snugly around ducts, conduits, pipes, and other items projecting through ceiling construction.

8. Install polystyrene board below roof, between purlins using self-adhered pin type insulation anchors with length of pin as required to match depth of insulation.

    1. Stagger vertical joints at least one stud from adjacent courses.

B. Continuous Insulation:

1. Continuous insulation shall be installed in accordance with manufacturer instructions. Fasten the insulation board to the exterior face of the steel stud wall framing using preassembled screw/stress plate fasteners, of type and length as recommended by the manufacturer. Fastener pacing shall be 12” on center at the board perimeter and 16” on center in the field of the board.

2. Bottom row of insulation panels shall be mounted on foundation casing “J” mold, refer to Section 09 2423, Cement Plaster and Metal Lath. Fasten insulation boards with corrosion resistant fasteners through sheathing into studs. Use 3/8 inch head roofing nails for wood studs, and self-drilling tapping screws for metal studs, or to “Z” channels, as applicable. Fastener penetration into studs shall be not less than 3/4 inch.

3. Stagger vertical joints at least one stud from adjacent courses.

3.03 PROTECTION

A. Protect Work of this section until Substantial Completion.

3.04 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION

SECTION 07 2200

ROOF DECK AND INSULATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide all labor, equipment, and materials to install roof insulation over the properly prepared deck substrate. A fully tapered insulation system and crickets shall be designed and installed to achieve positive drainage

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Division 1 Specification Sections apply to this section.

B. Related work specified elsewhere:

1. Section 07 5216 SBS Modified Bituminous Membrane Roofing

2. Section 07 6000 Flashing and Sheet Metal

1.03 SUBMITTALS

A. Submit under provisions of Section 01 3300 – Submittals Proceedures.

B. Product Data: Provide manufacturer's specification data sheets for each product in accordance with Section 01 3300.

C. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.

D. Provide a sample of each insulation type.

E. Shop Drawings

1. Submit manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles.

2. Shop drawing shall include: Outline of roof, location of drains, complete board layout of tapered insulation components, thickness and the average "R" value for the completed insulation system.

F. Certification

1. Submit roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.

2. Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

3. Submit certification that insulation and fastening system furnished is Tested and Approved by Factory Mutual for 1-90 Wind Up-Lift Requirements.

1.04 QUALITY ASSURANCE

A. Fire Classification, ASTM E-108

B. Submit certification that the roof system furnished is approved by Factory Mutual, Underwriters Laboratories or Warnock Hersey for external Fire E-108 Class 1A and that the roof system is adhered properly to meet or exceed 1-90.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.

B. Store all insulation materials in a manner to protect them from the wind, sun and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.

C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).

D. Store materials off the ground. Any warped, broken or wet insulation boards shall be removed from the site. No roofing materials shall be stored on any finished roof areas.

PART 2 - PRODUCTS

2.01 APPROVED EQUIVALENT

A Contractor must submit any product not specified a minimum five days before the bid date to Architect in order for product to be considered for approval. The Architect will notify Contractor in writing of decision to accept or reject request.

2.02 INSULATION MATERIALS

A. Provide thicknesses of insulation as indicated, provide combination of types and thicknesses to provide a complete system.

1. RIGID POLYISOCYANURATE ROOF INSULATION

a. Qualities: Rigid, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers, ¼ minimum inch per foot tapered insulation system.

b. Insulation board shall meet the following requirements
1. UL, WH or FM listed under Roofing Systems
2. Federal Specification HH-I-1972, Class 1

c. Physical Properties

Dimensional Stability	ASTM D-2126	2% max.
Compressive Strength	ASTM D-1621	20 psi min.
Vapor Permeability	ASTM E-96	1 perm max.
Foam Core Density	ASTM D-1622	2.0 pcf min.
Water Absorption	ASTM C-209	<1%

R-Factor HR per inch Thickness
ASTM C-518 5.6 (Design Value)

2. DENSDECK PRIME ROOF INSULATION

a. Qualities: Rigid, non structural glass mat gypsum roof board over the base layer of polyisocyanurate insulation.

1. Board Size: 2’ x 4’
2. Thickness: 1/4” minimum over rigid insulation
3. Thickness: 5/8” minimum directly over metal deck

2.03 RELATED MATERIALS

A. Fiber Cant and Tapered Edge Strips: Performed rigid insulation units of sizes/shapes indicated, matching insulation board or of perlite or organic fiberboard, as per the approved manufacturer.

B. Protection Board: DensDeck Prime

C. Roof Board Joint Tape: 6” wide glass fiber mat with adhesive compatible with insulation board facers. As required by the roofing system manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION OF SURFACES

A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation.
1. Verify that work which penetrates roof deck has been completed.
2. Verify that wood nailers are properly and securely installed.
3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
4. Do not proceed until defects are corrected.
5. Do not apply insulation until substrate is sufficiently dry.
6. Broom clean substrate immediately prior to application.
7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.

3.02 INSTALLATION

A. Attachment with mechanical fasteners:

1. Mechanically fasten per ASCE 7-10 wind uplift requirements

3.03 CLEANING

A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane.

END OF SECTION

SECTION 07 2500

WEATHER/AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Weather barrier membrane
2. Seam Tape
3. Weather barrier self-adhered membrane Flashing
4. Fasteners

B. Related Requirements:

1. Section 09 2420 – Furring and Lathing
2. Section 09 2423 - Portland Cement Plaster
3. Section 09 2520 – Gypsum Sheathing

1.2 REFERENCES

A. ASTM International

1. ASTM C 920; Standard Specification for Elastomeric Joint Sealants
2. ASTM C 1193; Standard Guide for Use of Joint Sealants
3. ASTM D 882; Test Method for Tensile Properties of Thin Plastic Sheeting
4. ASTM D 1117; Standard Guide for Evaluating Non-woven Fabrics
5. ASTM E 84; Test Method for Surface Burning Characteristics of Building Materials
6. ASTM E 96; Test Method for Water Vapor Transmission of Materials
7. ASTM E 1677; Specification for Air Retarder Material or System for Framed Building Walls

B. AATCC – American Association of Textile Chemists & Colorists

1. Test Method 127 Water Resistance: Hydrostatic Pressure Test

C. TAPPI

1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
2. Test Method T-460; Air Resistance of Paper (Gurley Hill Method)

1.3 SUBMITTALS

A. Product Data: Submit manufacturer current technical literature for each component.

B. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.

C. Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
2. Manufacturer Instructions: Provide manufacturer's written installation instructions.
3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.

D. Closeout Submittals
1. Weather Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion.

1.4 QUALITY ASSURANCE

A. Qualifications

1. Installer shall have experience with installation of DuPont™ Tyvek® weather barrier assemblies under similar conditions.
2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
3. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

B. Mock-up

1. Install mock-up using approved weather barrier assembly including fasteners, flashing, tape and related accessories per manufacturer's current printed instructions and recommendations.

   a. Mock-up size: [10 feet by 10 feet] .
   b. Mock-up Substrate: Match wall assembly construction, including window opening.

2. Contact manufacturer's designated representative prior to weather barrier assembly installation, to perform required mock-up visual inspection and analysis as required for warranty.

C. Pre-installation Meeting

1. Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, installer, Owner's Representative, and weather barrier manufacturer's designated representative.
2. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

1.5 SCHEDULING

A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.

B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.6 WARRANTY

A. Special Warranty

1. Weather barrier manufacturer's warranty for weather barrier for a period of ten years from date of Substantial Completion.
2. Approval by weather barrier manufacturer for warranty is required prior to assembly installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER & MATERIALS

A. E.I. du Pont de Nemours and Company ; 4417 Lancaster Pike, Chestnut Run Plaza 721, Wilmington, DE 19805; 1.800.44TYVEK (8-9835); http://construction.tyvek.com

Weather Barrier - Basis of Design: High-performance, flash spun-bonded olefin, non- woven, non-perforated, primary weather barrier is based upon DuPont™ Tyvek® CommercialWrap® and related assembly components.

B. Fiberweb: Typar MetroWrap

C. Vaproshield USA: Vaproshield Wallshield IT

D. Approved equal

E. Building paper – Second, outbound layer only under Stucco facades:

Fortifiber: Super JumboTex

F. Performance Characteristics:

1. Air Penetration: Type 1 when tested in accordance with ASTM E 1677.
2. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E 96, Method B.
3. Water Penetration Resistance: 235 cm when tested in accordance with AATCC Test Method 127.
4. Basis Weight: 2.4 oz/yd^2, when tested in accordance with TAPPI Test Method T-410.
5. Air Infiltration Resistance: Air infiltration at >750 seconds, when tested in accordance with TAPPI Test Method T-460.
6. Tensile Strength: 33/41 lbs/in., when tested in accordance with ASTM D 822 , Method A.
7. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E 84 . Flame Spread: 15, Smoke Developed: 25.

2.2 ACCESSORIES

A. Seam Tape: 3” DuPont™ Tyvek® Tape as manufactured by DuPont or approved equal

B. Fasteners:

1. Steel Frame Construction DuPont™ Tyvek® Wrap Cap Screws,: 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap fasteners.
2. Wood Frame Construction DuPont™ Tyvek® Wrap Caps: #4 nails with large 1-inch plastic cap fasteners
3. Masonry Construction Masonry tap-con fasteners with DuPont™ Tyvek® Wrap Caps: 2-inch diameter plastic cap fasteners.

C. Sealants

1. Provide sealants that comply with ASTM C 920, elastomeric polymer sealant to maintain watertight conditions.
2. Products:

    a. OSI Quad Max
    b. Tremco Butyl
    c. Sika 1A

D. Adhesives:

1. Provide adhesive recommended by weather barrier manufacturer.
2. Products:

    a. Liquid Nails® LN-109
    b. 3M High Strength 90
    c. Loctite 300
    d. Adhesives recommend by the weather barrier manufacturer.

E. Primers:

1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.

2. Products:

    a. 3M High Strength 90
    b. Denso Butyl Spray
    c. Loctite 300
    d. Primers recommended by the flashing manufacturer

F. Flashing:

1. DuPont™ FlexWrap™, DuPont™ StraightFlash™, DuPont™ Flashing Tape™ as basis of design or approved equal. Flashings must be all butyl self-adhered flashing for the rough openings and penetrations, used as a one source system approach with weather barrier.

G. Building Paper:

1. Single layer 1 ply asphalt saturated kraft Grade D breather type sheathing paper. Standard; Federal Specification UU-B-790a, Type 1, Grade D, Style 2.

2. Products:

   a. Classic: Fortifiber® / Jumbo Tex®

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION - WEATHER BARRIER

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations

   1. Install weather barrier prior to installation of windows and doors. Follow manufacturer's published installation guidelines.

B. Weather Barrier Attachment:

   1. Steel or Wood Frame Construction Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
   2. Masonry Construction Attach weather barrier to masonry. Secure using weather barrier manufacturer recommend fasteners, space 6-18 inches vertically on center and 24 inches maximum horizontally. Weather barrier may be temporarily attached to masonry using recommended adhesive, placed in vertical strips spaced 24 inches on center, when coordinated on the project site.

C. Apply self-adhered flashing to weather barrier membrane prior to the installation cladding anchors. See manufacturer for recommendations.

3.3 SEAMING

A. Seal seams of weather barrier with 3" seam tape at all vertical and horizontal overlapping seams by 6" and 12" at the corners.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 FIELD QUALITY CONTROL

A. Notify manufacturer's designated representative to obtain required periodic observations of weather barrier assembly installation.

3.5 BUILDING PAPER (OUTER LAYER AT CEMENT PLASTER FINISHES):

A. After installation of the weather barrier is complete including all flashings and sealants, apply building paper in accordance with manufacturer's recommendations, laid smooth without folds or bunches of material.

3.6 PROTECTION

A. Protect installed weather barrier from damage.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

Products supplied under this section:

1. Vapor barrier and installation accessories for installation under concrete slabs.

Related sections:

1. Section 03 30 00 Cast-in-Place Concrete
2. Section 07 26 00 Vapor Retarders

1.2 REFERENCES

A. ASTM International:

1. ASTM E1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E1643-18a Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. Technical Reference - American Concrete Institute (ACI):

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
2. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.

1.3 SUBMITTALS

A. Quality control/assurance:

1. Summary of test results per paragraph 9.3 of ASTM E1745.
2. Manufacturer's samples and literature.
3. Manufacturer's installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Vapor Barrier – Typical – Vapor barrier shall have all of the following qualities:

1. Maintain permeance of less than 0.01 Perms [grains/(ft^2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
2. Other performance criteria:
   a. Strength: ASTM E1745 Class A.

b. Thickness: 15 mils minimum

3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1

B. Vapor Barrier – At Rigging Pit - Vapor barrier shall have all of the following qualities:

1. Maintain permeance of less than 0.01 Perms [grains/(ft^2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
2. Other performance criteria:
   a. Strength: ASTM E1745 Class A.
   b. Thickness: 20 mils minimum
3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1

C. Vapor barrier products:

1. Basis of Design: Stego Wrap 20-Mil Vapor Barrier by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.
2. Or Equal.

2.2 ACCESSORIES

A. Seams:

1. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

B. Sealing Penetrations of Vapor barrier:

1. Stego Mastic by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
2. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

C. Perimeter/edge seal:

1. Stego Crete Claw by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
2. Stego Term Bar by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
3. StegoTack Tape (double-sided sealant tape) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

D. Penetration Prevention:

1. Beast Foot by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
2. Beast Form Stake by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com

E. Vapor Barrier-Safe Screed System

1. Beast Screed by Stego Industries, LLC, (877) 464-7834 www.stegoindustries.com.
2. Beast Hook by Stego Industries, LLC, (877) 464-7834 www.stegoindustries.com.

PART 3 – EXECUTION

3.1 PREPARATION

A. Ensure that subsoil is approved by Architect or Geotechnical Engineer.
   1. Level and compact base material.

3.2 INSTALLATION

A. Install vapor barrier in accordance ASTM E1643.
   1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
   2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
      a. Seal vapor barrier to the entire perimeter wall or footing/grade beam with double sided StegoTack Tape, or both Stego Term Bar and StegoTack Tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.
   3. Overlap joints 6 inches and seal with manufacturer's seam tape.
   4. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
   5. Seal all penetrations (including pipes) per manufacturer's instructions.
   6. For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier. Use Beast Form Stake and Beast Foot as a vapor barrier-safe forming system. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
   7. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
   8. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
   9. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
   10. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

END OF SECTION

SECTION 07 4223
METAL WALL PANELS

PART 1 GENERAL

1.1 SUBMITTALS

A. Action Submittals.
   1. Shop Drawings: Illustrate products, installation, and relationship to adjacent construction.
   2. Panel Calculations: Sealed calculations for panel structural integrity by licensed engineer.
   3. Product Data: Manufacturer's descriptive data and product attributes for metal panels.
   4. Samples: Selection samples and Verification samples.

B. Informational Submittals:
   1. Certificate of Compliance: Certification that installed products meet specified design and performance requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:
   1. Attendance: Design Professional, Contractor, Construction Manager, installer, and related trades.
   2. Review: Project conditions, manufacturer requirements, delivery and storage, staging and sequencing, and protection of completed work.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Live and dead loads in accordance with Building Code.
   2. Minimum wind pressure of 34 PSF, as indicated on Drawings, tested to ASTM E1592 (see Morin available panel profiles)
   3. Air leakage: Maximum (0. CFM steel) (0. CFM alum) per square foot of roof area, measured at reference differential pressure across assembly of PSF, tested to ASTM E283.
   4. Water leakage: None, tested to ASTM E331 at test pressure of PSF.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Firm specializing in work of this Section with minimum 5 years' experience.

B. Mockup: 8 x 8 feet. Approved mockup may remain as part of the Work.

1.5 WARRANTIES

A. Manufacturer's 2 year warranty against defects in materials and workmanship.

B. Manufacturer's 20 year warranty against chipping, cracking, fading, or delamination of panel finish.

C. Installer's 2 year warranty against water leakage through wall system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Contract Documents are based on products by Morin Corporation, www.morincorp.com.

B. Substitutions: Refer to Division 01.

2.2 MATERIALS

A. Aluminum-Zinc Alloy Coated Steel Sheet: ASTM A792, [AZ50] [AZ55] coating class.

2.3 ACCESSORIES

A. Closure Strips: Closed cell rubber, minimum 1 inch thick, to match panel profile. Metal closure fabricated from same material, gage, and finish as panels.

B. Tapes and Sealers: Types recommended by panel manufacturer.

2.4 FABRICATION

A. Roll form panels from minimum 18gage aluminum-zinc alloy coated steel

B. Wall Panels:
   1. Profile: Pulse Panel (P-3)
   2. Panel width: 12” inches.
   3. Panel depth: 1 ½” inches.
   4. Panel joint: Tongue and groove interlock.
   5. Panel Attachment: Concealed floating [MIP] clip and fastener.
   6. Perforation pattern - aluminum only: 1/8" hole 3/16" spacing 40% open area

2.5 FINISHES

(Galvalume/Zincalume Plus) steel panel.

A. Panels and Trim:
   1. Coating type: Fluropon PVDF.
   2. Color: Zinc Gray

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved Shop Drawings.

B. Fasten panels using concealed clip and fasteners.

C. Install closure strips per manufacturer’s instructions at exposed panel edges.

D. Installation Tolerances:
   1. Maximum variation from plane: 1/4” inch in 20 feet, noncumulative.

END OF SECTION

SECTION 07 5200

MODIFIED BITUMINOUS MEMBRANE ROOFING - HOT APPLIED

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes modified bituminous roofing system.

Scope of Work

1. Omit all references to the Title24 cool roof products White Star and Garla Block. The Cool Roof products to be applied to the finished membrane are Cool Sil Bleed Blocker applied at 1 gal per square and Cool-Sil applied at 3 Gallons per square.

2. Follow Garland Company Details provided in Appendix A for Exhaust Fan, Hatch, Pipe Housing & Curbs.

3. Inspect metal decking and notify IOR of any discrepancies that would prevent installation of the roof assembly. Mechanically fasten insulation and ¼" asphalt saturated fiberboard per ASCE 7-16.

4. Install in hot asphalt install Stressbase 80, 20% pre consumer recycled content, LEED 10% MR 4 recycled content, UL Environment certified. Then Install in hot asphalt base flashings with StressPly E, Bio Based, and recycled content post-consumer 11% and 28% pre consumer, LEED 25%, MR 4 recycled content, MR 6 Rapidly renewable content, UL Environment Certified. Then Install in hot asphalt StressPly plus FR Mineral Cap sheet, recycled content 6 percent, LEED MR 4 recycled content, UL Environment Certified.

5. Install Garla Block primer and White Star Polyurea in 3/8" A1 Grit Glacier gravel, SRI 111, LEED MR 5 Regional Resource, LEED SS 7.2 Heat Island Effect, LEED EA1 Optimize Energy performance.

6. **Roofing CONTRACTOR responsible for furnishing and installing roof related sheet metal accessories to include, ANSII SPRI ES1 R-mer Edge Flashing and termination system coping capledge metal, lead jacks, draw bands, counter flashings to reglets, drain flashings, drain bowl assembly's, sheet metal curb flashing, gutters, and downspouts**. Sheet metal fluorocarbon baked color to be selected by ARCHITECT.

7. Install roof system per ASCE 7-16, calculations must be building and geographic specific. Install perimeter metal per ANSI/SPRI ES 1 building and geographic specific. ASCE 7-16 calculations and ANSI/SPRI ES1 must be submitted by CONTRACTOR to comply with IBC and CBC.

8. CONTRACTOR to supply with five (5) year material and labor warranty. Manufacturer to supply Thirty (30) Year No Dollar Limit Leak Warranty covering workmanship and material.

B. CMAS Instructions:

1. *All product in bold and underlined will be furnished by the DISTRICT. All products in bold will be manufactured by The Garland Company and purchased by HLP USD using its authority under the CMAS contract.

2. Contract #: 4-01-56-0006A
GSA Contract #: GS-07F-0130K (THE GARLAND COMPANY, INC.)

3. All other materials required to complete construction per these construction documents are the sole responsibility of the CONTRACTOR and shall be inclusive of the bid.

4. CONTRACTOR is responsible for receiving of all HLP DISTRICT purchased material on site. Upon receipt CONTRACTOR assumes full liability for DISTRICT purchased materials. CONTRACTOR will assume full responsibility for safe storage and protection of DISTRICT purchased material. Unless otherwise agreed to CONTRACTOR will receive DISTRICT purchased material via FOB Garland, unload, and store materials at HLPUSD.

Performing Arts Center:
- **StressPly Plus FR mineral: 202 rolls**
- **Stressbase 80: 101 rolls**
- **Garla Block: 16 buckets**
- **KEE Lock Mastic: 19 buckets**
- **Cool Sil Bleed Blocker: 31 buckets**
- **Cool-Sil: 91 buckets**

C. Related Work Specified Elsewhere:

1. Roofing Demolition: Section 07 01 55 - Modified Bituminous Membrane Re-Roofing Procedures.

2. Metal Roof Decks: Refer to Division 05 Section - Metal Decking.

3. Roof Insulation: Section 07 22 00 - Roof Insulation.

4. Vapor Barrier: Section 07 26 15 - Above-Grade Vapor Barriers.

5. Sheet Metal Flashing and Trim: Section 07 60 00 – Flashing and Sheet Metal.

6. Sheet Metal Roof Accessories: Section 07 71 00 - Roof Specialties.

1.3 REFERENCES

A. American Society of Civil Engineers (ASCE):

1. ASCE 7-17, Minimum Design Loads for Buildings and Other Structures.

B. American Society for Testing and Materials (ASTM):

1. ASTM D41 Standard Specification for Asphalt Primer Used in Roofing, Damp proofing and Waterproofing.
2. ASTM D312 Standard Specification for Asphalt Used in Roofing.
3. ASTM D451 Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.
4. ASTM D1079 Standard Terminology Relating to Roofing, Waterproofing and Bituminous Materials.
5. ASTM D1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
6. ASTM D1863 Standard Specification for Mineral Aggregate Used as a Protective Coating for Roofing.
7. ASTM D2178 Standard Specification for Asphalt Glass Felt Used as a Protective Coating for Roofing.
8. ASTM D2822 Standard Specification for Asphalt Roof Cement.
9. ASTM D2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coating.
10. ASTM D4601 Standard Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing.
11. ASTM D5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
12. ASTM D6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
13. ASTM D6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
14. ASTM E108 Standard Test Methods for Fire Test of Roof Coverings.

C. Factory Mutual Research (FM):

1. Roof Assembly Classifications.

D. National Roofing CONTRACTORs Association (NRCA):

1. Roofing and Waterproofing Manual.

E. Underwriters Laboratories, Inc. (UL):

1. Fire Hazard Classifications.

F. Warnock Hersey (WH):

1. Fire Hazard Classifications.

G. American National Standards Institute and Single Ply Roofing Institute (ANSI/SPRI)

1. ANSI/SPRI ES-1 Testing and Certification Listing of Shop Fabricated Edge Metal

1.4 SUBMITTALS FOR REVIEW

A. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.

B. Samples: Submit two (2) samples of the following:

C. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the OWNER.

D. Any material submitted as equal to the specified material must be accompanied by a report signed and sealed by a professional engineer licensed in the state in which the installation is to take place. This report shall show that the submitted equal meets the Design and Performance criteria in this specification. Substitution requests submitted without licensed engineer approval will be rejected for non-conformance.

1.5 SUBMITTALS FOR INFORMATION

A. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the membrane.

B. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.

C. Manufacturer's Certificate: Certify that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

D. Manufacturer's Certificate: Submit a certified copy of the roofing manufacturer's ISO 9001 compliance certificate.

E. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM

D5147.

F. Written certification from the roofing system manufacturer certifying the applicator is currently authorized for the installation of the specified roof system.

G. Design Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7-16 and ASNI/SPRI ES1, Method 2 for Components and Cladding, sealed by a registered professional engineer. In no case shall the design loads be taken to be less than those detailed in Design and Performance Criteria article of this specification.

H. Qualification data for firms and individuals identified in Quality Assurance Article below.

1.6 CONTRACT CLOSEOUT SUBMITTALS

A. General: Comply with Requirements of Division 01 Section - Closeout Submittals.

B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.

C. Insurance Certification: Assist OWNER in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

D. Demonstration and Training Schedule: Provide a schedule of proposed dates and times for instruction of OWNER'S personnel in the maintenance requirements for completed roofing work.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with not less than 20 years documented experience and have ISO 9001 certification.

B. Installer Qualifications: Company specializing in modified bituminous roofing installation with not less than 10 years' experience and authorized by roofing system manufacturer as qualified to install manufacturer's roofing materials.

C. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress. Maintain proper supervision of workmen.

D. Maintain a copy of the Contract Documents in the possession of the Supervisor/Foreman and on the roof at all times.

E. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.

1. Upon request of the ARCHITECT or OWNER, submit Manufacturer's

written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

F. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001.

1.8 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of modified bituminous roofing system installation and associated work.

B. Require attendance of installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing that must precede or follow roofing work (including mechanical work if any), ARCHITECT, OWNER, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) OWNER'S insurers, testing agencies and governing authorities. Objectives of conference include:

1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.

2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations, and other preparatory work performed by others.

3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.

4. Review roofing system requirements (drawings, specifications, and other contract documents).

5. Review required submittals both completed and yet to be completed.

6. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

7. Review required inspection, testing, certifying and material usage accounting procedures.

8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).

9. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.

10. Review notification procedures for weather or non-working days.

C. The OWNER'S Representative will designate one of the conference participants to record the proceedings and promptly distribute them to the participants for record.

D. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved to the satisfaction of the OWNER. This shall not be construed as interference with the progress of Work on the part of the OWNER.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.

B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to prevent moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).

C. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.

D. Secure all material and equipment on the job site. If any material or equipment is stored on the roof, assure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the CONTRACTOR'S actions will be the sole responsibility of the CONTRACTOR, and the deck will be repaired or replaced at his expense.

1.10 MANUFACTURER'S INSPECTIONS

A. When the Project is in progress, the roofing system manufacturer will provide the following:

1. Report progress and quality of the work as observed.

2. Provide daily job site inspections.

3. Report to the OWNER in writing any failure or refusal of the CONTRACTOR to correct unacceptable practices called to the CONTRACTOR'S attention.

4. Confirm after completion that manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.11 PROJECT CONDITIONS

A. Proceed with roofing work only when existing and forecasted weather conditions will permit a unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.

B. Do not apply roofing insulation or membrane to damp deck surface.

C. Do not expose materials subject to water or solar damage in quantities greater than can be weatherproofed during same day.

D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank one (1) inch cap nails, or screws and plates at a rate of one (1) fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and four (4) ft o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate back nailing. Install four (4) additional fasteners at the upper edge of the membrane when strapping the plies.

1.12 SEQUENCING AND SCHEDULING

A. Sequence installation of roofing with related units of work specified in other Sections to ensure that roof assemblies, including roof accessories, flashing, trim and joint sealers, are protected against damage from effects of weather, corrosion, and adjacent construction activity.

B. Complete all roofing field assembly work each day. Phased construction will not be accepted.

1.13 WARRANTY

A. Upon completion of installation, and acceptance by the OWNER and ARCHITECT, the Manufacturer will supply to the OWNER a 30-year no dollar limit leak warranty covering workmanship and material.

B. Installer will submit a 5-year warranty to the membrane manufacturer with a copy directly to OWNER.

1.14 DESIGN AND PERFORMANCE CRITERIA

A. Uniform Wind Uplift Load Capacity

1. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with ASCE 7-16 and ANSI/SPRI ES1. Calculations must be job and site specific.

B. Live Load: 20 psf, or not to exceed original building design. CONTRACTOR to confirm load limits for storage of equipment and materials with the GC/CM/ or ARCHITECT.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. Refer to Division 01 Section Common Product Requirements.

B. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and CONTRACTOR/fabricator quality and performance criteria specified in Part 1.

2.2 ACCEPTABLE MANUFACTURERS

A. The design is based upon roofing systems engineered and manufactured by The Garland Company for HLPUSD standard:

The Garland Company 3800 East 91st Street Cleveland, Ohio 44105
Sean Magee
Telephone: (310) 420-0713 smagee@garlandind.com

2.3 DESCRIPTION

A. Modified bituminous roofing work including but not limited to:

1. One (1) ply of Garland StressBase 80 base sheet bonded to the prepared substrate with bitumen.

2. Hot Bitumen: ASTM D312, Type IV special steep asphalt having the following characteristics:

   a. Softening Point 210°F - 225°F

   b. Flash Point 500°F

   c. Penetration @ 77°F 15-25 units

   d. Ductility @ 77°F 1.5 cm

3. Base Flashing Ply: One (1) ply of Stressbase E environmental SBS base flashing ply covered by an additional layer of modified bitumen membrane and set in bitumen.

4. Modified Membrane: STRESSPLY PLUS FR MINERAL - Environmentally Friendly; 145 mil SBS (Styrene-Butylene-Styrene) mineral surfaced, rubber modified roofing membrane incorporating recycled rubber, fire retardant characteristics and reinforced with a fiberglass and polyester composite scrim.

5. Surfacing: Apply White Star Polyurea SRI 111 and 3/8-inch whitewashed gravel.

6. Hot Surfacing Bitumen: ASTM D312, Type IV special steep asphalt having the following characteristics:

   a. Softening Point 210°F - 225°F

   b. Flash Point 500°F

c. Penetration @ 77°F 15-25 units

d. Ductility @ 77°F 1.5 cm

2.4 BITUMINOUS MATERIALS

A. Asphalt Primer: Garla Prime water based V.O.C. compliant, ASTM D41.

B. Asphalt Roofing Mastic: KEE Lock Flashing adhesive V.O.C. free.

C. Interply Adhesive: ASTM D312, Type IV.

2.5 SHEET MATERIALS

A. Base Ply (StressPly E Environmental): Fiberglass scrim with the following minimum performance requirements according to ASTM D5147. Properties (Finished Membrane):

1. Tensile Strength (ASTM D2523)

a. 2 in/min. @ 73.4 ± 3.6°F MD 100 lbf/in CMD 500 lbf/in

b. 50mm/min. @ 23 ± 3°C MD 39 kN/m CMD 39 kN/m

2. Tear Strength (ASTM D4073)

a. 2 in/min. @ 73.4 ± 3.6°F MD 900 lbf CMD 950 lbf b.50mm/min. @ 23 ± 3°C MD 4003 N CMD 4226 N

3. Elongation at Maximum Tensile (ASTM D2523)

a. 2 in/min. @ 73.4 ± 3.6°F MD 6 % CMD 6 %

b. 50mm/min@ 23 ± 3°C MD 6 % CMD 6 %

C. Modified Flashing Ply:

1. STRESSPLY PLUS FR MINERAL

D. Modified Membrane Properties (Finished Membranes): STRESSPLY PLUS FR MINERAL; ASTM D6162, Type III Grade G

1. Tensile Strength (ASTM D5147)

a. 2 in/min. @ 73.4 ± 3.6°F MD 310 lbf/in CMD 310 lbf/in b.50 mm/min. @ 23 ± 3°C MD 54.2 kN/m CMD 54.2 kN/m

2. Tear Strength (ASTM D5147)

a. 2 in/min. @ 73.4 ± 3.6°F MD 500 lbf CMD 500 lbf b.50 mm/min. @ 23 ± 3°C MD 2224 N CMD 2224 N

3. Elongation at Maximum Tensile (ASTM D5147)

a. 2 in/min. @ 73.4 ± 3.6°F MD 3.5% CMD 3.5%

b. 50 mm/min. @ 23 ± 3°C MD 3.5% CMD 3.5%

4. Low Temperature Flexibility (ASTM D5147): Passes -30°F (-34°C)

2.6 SURFACINGS

A. White Star Polyurea Energy Star and Title 24 approved roof coating:

1. SRI 111

2.7 RELATED MATERIALS

A. Roof Insulation: In accordance with specification.

B. Roof Insulation Fasteners as recommended and approved by materials manufacture.

C. Base Sheet: ASTM D4601, HPR Type II; as recommended and furnished by the modified membrane manufacturer.

D. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless-steel nails shall be used with aluminum; and stainless- steel nails shall be used with stainless steel. Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the deck material. Nails and fasteners shall be flush- driven through flat metal discs of not less than one (1) inch diameter. Omit metal discs when one- piece composite nails or fasteners with heads not less than one (1) inch diameter are used.

E. Metal Discs: Flat discs or caps of zinc-coated sheet metal not lighter than twenty-eight (28) gauge and not less than one (1) inch in diameter. Form discs to prevent dishing. Bell or cup shaped caps are not acceptable.

F. Sealant: KEE Lock zero VOC Single component, 100% solids structural adhesive as furnished and recommended by the membrane manufacturer.

1. Elongation (ASTM D412) 300%

2. Hardness, Shore A (ASTM C920) 50

3. Shear Strength (ASTM D1002) 300 psi

G. Butyl Tape: 100% solids, asbestos free and compressive tape designed to seal as recommended and furnished by the membrane manufacturer.

H. Glass Fiber Cant: Continuous triangular cross Section made of inorganic fibrous glass used as a cant strip as recommended and furnished by the membrane manufacturer.

I. Vents and Breathers: Heavy gauge aluminum and fully insulated vent that allows

moisture and air to escape but not enter the roof system as recommended and furnished by the membrane manufacturer.

J. Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled.

PART 3 - EXECUTION

3.1 EXECUTION, GENERAL

A. Comply with requirements of Division 01 Section "Common Execution Requirements."

3.2 EXAMINATION

A. Verify that deck surfaces and project conditions are ready to receive work of this Section.

B. Verify that deck is supported and secured to structural members.

C. Verify that deck is clean and smooth, free of depressions, projections, or ripples, and is properly sloped to eaves.

D. Verify that adjacent roof substrate components do not vary more than [¼] inch in height.

E. Verify that deck surfaces are dry.

F. Confirm that moisture content does not exceed twelve (12) percent by moisture meter tests.

G. Verify that openings, curbs, pipes, conduit, sleeves, ducts, and other items which penetrate the roof are set solidly, and that [wood cant strips] [wood nailing strips] [and reglets] are set in place.

3.3 DECK PREPARATION

A. Metal Deck

1. Verify no deficiencies exist in deck.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.

B. Insurance/Code Compliance: Where required by code, install, and test the roofing system to comply with governing regulation and specified insurance requirements.

C. Protect other work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore other work

damaged by installation of the coal tar modified bituminous roofing system.

D. Coordinate installation of roofing system components so that insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut-offs at end of each day's work to cover exposed ply sheets and insulation with two (2) plies of #15 organic roofing felt set in full moppings of bitumen and with joints and edges sealed with roofing cement. Remove cut-offs immediately before resuming work.

E. Asphalt Bitumen Heating: Heat and apply bitumen in accordance with the Equiviscous Temperature (EVT) Method as recommended by National Roofing CONTRACTORs Association (NRCA). Do not raise temperature above minimum normal fluid-holding temperature necessary to attain EVT (plus 5°F at point of application) more than one (1) hour prior to time of application. Determine flash point, finished blowing temperature, EVT, and fire-safe handling temperature of bitumen either from information by manufacturer or by suitable test. Do not exceed recommended temperature limits during bitumen heating. Do not heat to a temperature higher than twenty-five degrees (25°F) below flash point. Discard bitumen that has been held at temperature exceeding Finishing Blowing Temperature (FBT) for more than three (3) hours. Keep kettle lid closed except when adding bitumen.

F. Asphalt Bitumen Mopping Rate:

1. Interply Mopping: Apply bitumen at the rate of approximately twenty-five (25) lb.(11.3kg) of bitumen per roof square.

2. Modified Membrane Mopping: Apply bitumen at the rate of approximately thirty (30) lb (13.6kg). of bitumen per roof square.

3. Flood Coat: Apply bitumen at the rate of approximately sixty (60) to seventy (70) lb.(27- 31kg) of bitumen per square (plus or minus twenty-five (25) percent on a total job average basis).

G. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

H. Apply roofing materials as specified by manufacturer's instructions.

1. Keep roofing materials dry before and during application.

2. Do not permit phased construction.

3. Complete application of roofing plies, modified sheet, and flashing in a continuous operation.

4. Begin and apply only as much roofing in one day as can be completed that same day.

I. Cut-Offs (Waterstops): At end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets and insulation. Provide temporary covering of two (2) plies of #15 organic roofing felt set in full moppings of bitumen with joints and edges sealed.

J. Broadcast minerals into the bleed out of bitumen while bitumen is at its recommended EVT temperature to achieve uniform color throughout.

3.5 VAPOR RETARDER INSTALLATION

A. Fiberglass Plies: Install ply sheets in twenty-five (25) lbs. (11.3kg) per square of bitumen shingled uniformly. Shingle in direction of slope of roof to shed water on each area of roof.

B. Lap ply sheet ends eight (8) inches (203mm). Stagger end laps twelve (12) inches (304mm) minimum.

C. Extend plies two (2) inches (50mm) beyond top edges of cants at wall and roof projections and equipment bases.

D. Install base flashing ply to all perimeter and projection details. Properly seal all curbs penetrations and perimeter, prior to application of remaining roof.

3.6 INSULATION INSTALLATION

A. Deck type: Metal

B. Attachment: attached per ASCE 7-16 to metal deck.

C. Insulation: See drawings and specifications. Recover board to be 1/4-inch asphalt saturated fiber board.

3.7 BASE PLY INSTALLATION

A. Fiberglass Plies: Install (1) one Stressbase 80 Fiberglass base sheet in twenty-five (25) lbs. (11.3kg) per square of bitumen shingled uniformly to achieve one ply over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof. Do not step on base rolls until asphalt has cooled, fish mouths should be cut and patched.

B. Lap ply sheet ends eight (8) inches (203mm). Stagger end laps twelve (12) inches (304mm) minimum

C. Extend plies two (2) inches (50mm) beyond top edges of cants at wall and roof projections and equipment bases.

D. Install base flashing ply to all perimeter and projection details after membrane application.

3.8 MODIFIED MEMBRANE APPLICATION

A. Solidly bond the modified membrane to the base layers with specified asphalt at the rate of twenty- five (25) to thirty (30) lbs. (11-13kg) per 100 square feet.

B. The modified membrane roll must push a puddle of asphalt in front of it with asphalt slightly visible at all side laps. Exercise care during application to eliminate air entrapment under the membrane.

C. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.

D. Install subsequent rolls of modified membrane across the roof as above with a minimum of four (4) inch (101mm) side laps and eight (8) inch (203mm) end laps. Stagger the end laps. Apply the modified membrane in the same direction as the previous layers but stagger the laps so they do not coincide with the laps of the base layers.

E. Apply asphalt no more than five (5) feet (1.5m) ahead of each roll being embedded.

F. Extend membrane two (2) inches (50mm) beyond top edge of all cants in full moppings of the specified asphalt [as shown on the drawings].

3.9 FLASHING MEMBRANE INSTALLATION

A. Seal all curb, wall and parapet flashings with an application of KEE Lock Flashing Adhesive and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.

B. Prepare all walls, penetrations, expansion joints, and where shown on the drawings to be flashed with asphalt primer at the rate of one hundred (100) square feet per gallon. Allow primer to dry tack free.

C. Use the modified membrane as the flashing membrane. Adhere to the underlying base flashing ply with specified asphalt unless otherwise noted in these specifications. Nail off at a minimum of eight (8) inches o.c. from the finished roof at all vertical surfaces.

D. Solidly adhere the entire sheet of flashing membrane to the substrate.

E. Seal all vertical laps of flashing membrane with a three-course application of trowel-grade KEE Lock Flashing Adhesive and fiberglass mesh.

F. Coordinate counter flashing, cap flashings, expansion joints, and similar work with modified bitumen roofing work as specified in other Sections.

G. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work [as specified in other Sections].

H. Metal Edge:

1. Inspect the nailer to assure proper attachment and configuration.

2. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at eight (8) inches o.c.

3. Install continuous cleat and fasten at six (6) inches o.c.

4. Install new metal edge hooked to continuous cleat and set in bed of roof cement. Fasten flange to wood nailer every three (3) inches o.c. staggered.

5. Prime metal edge at a rate of one hundred (100) square feet per gallon

and allow to dry.

6. Strip in flange with base flashing ply covering entire flange in bitumen with six (6) inches on to the field of roof. Assure ply laps do not coincide with metal laps.

7. Install a second ply of modified flashing ply in bitumen over the base flashing ply, nine (9) inches on to the field of the roof.

I. Roof Edge with Gutter:

1. Inspect the nailer to assure proper attachment and configuration. Increase slope at metal edge by additional degree of slope in first board.

2. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at eight (8) inches o.c.

3. Install gutter and strapping.

4. Install continuous cleat and fasten at six (6) inches o.c.

5. Install new metal edge hooked to continuous cleat and set in bed of roof cement. Fasten flange to wood nailer every three (3) inches o.c. staggered.

6. Prime metal edge at a rate of one hundred (100) square feet per gallon and allow to dry.

7. Strip in flange with base flashing ply covering entire flange in bitumen with six (6) inches onto the field of the roof. Assure ply laps do not coincide with metal laps.

8. Install a second ply of modified flashing ply in bitumen over the base flashing ply, nine (9) inches on to the field of the roof.

J. Exhaust Fan:

1. Minimum curb height is eight (8) inches. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.

2. Set cant in bitumen. Run all plies over cant a minimum of two (2) inches.

3. Install base flashing ply covering curb with six (6) inches on to field of the roof.

4. Install a second ply of modified flashing ply installed over the base flashing ply, nine (9) inches on to field of the roof. Attach top of membrane to top of wood curb and nail at eight (8) inches o.c. Apply a three-course application of KEE Lock Flashing Adhesive and mesh at all vertical seams and allow to cure and aluminize.

5. Install metal exhaust fan over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendation.

K. Passive Vent/Air Intake:

1. Minimum curb height is eight (8) inches. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.

2. Set cant in bitumen. Run all plies over cant a minimum of two (2) inches.

3. Install base flashing ply covering curb with six (6) inches on to the field of the roof.

4. Install a second ply of modified flashing ply installed over the base flashing ply, nine (9) inches on to field of the roof. Attach top of membrane to top of wood curb and nail at eight (8) inches o.c. Apply a three-course application of KEE Lock Flashing Adhesive and mesh at all vertical seams and allow to cure and aluminize.

5. Install passive vent/air intake over the wood nailers and flashing to act as counterflashing. Fasten per manufacturers recommendations.

L. Plumbing Stack:

1. Minimum stack height is twelve (12) inches.

2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.

3. Prime flange of new sleeve. Install properly sized sleeves set in (¼) inch bed of roof cement.

4. Install base flashing ply in bitumen.

5. Install membrane in bitumen.

6. Caulk the intersection of the membrane with elastomeric sealant.

7. Turn sleeve a minimum of one (1) inch down inside of stack.

M. Coping Cap:

1. Minimum flashing height is eight (8) inches. Maximum flashing height is twenty- four (24) inches. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow drying.

2. Set cant strip in bitumen. Run all field plies over cant strip a minimum of two (2) inches.

3. Install base flashing ply (6) inches on to field of the roof and set in hot asphalt. Nail membrane at eight (8) inches o.c.

4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, nine (9) inches on to the field of the roof. Apply a three-course application of KEE Lock mesh at all seams and allow to cure.

5. Install coping chairs 5’on center. Install R-edge ANSI/SPRI ES1 coping cap per manufacturer's recommendations.

N. Roof Drain:

1. Plug drain to prevent debris from entering plumbing.

2. Taper insulation to drain minimum of twenty-four (24) inches from center of drain.

3. Run roof system plies over drain. Cut out plies inside drain bowl.
4. Set lead/copper flashing (thirty (30) inch square minimum) in (¼) inch bed of KEE Lock Flashing Adhesive. Run lead/copper into drain a minimum of two (2) inches. Prime lead/copper at a rate of one hundred (100) square feet per gallon and allow to dry.

5. Install base flashing ply (forty (40) inch square minimum) in bitumen.

6. Install modified membrane (forty-eight (48) inch square minimum) in bitumen.

7. Install clamping ring and assure that all plies are under the clamping ring.

8. Remove drain plug and install strainer.

O. Curb Detail/Air Handling Station:

1. Minimum curb height is eight (8) inches. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.

2. Set cant in bitumen. Run all field plies over cant a minimum of two (2) inches.

3. Install base flashing ply covering curb set in bitumen with six (6) inches on to field of the roof.

4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, nine (9) inches on to the field of the roof. Apply a three-course application of KEE Lock and mesh at all vertical seams and allow to cure.

5. Install pre-manufactured counterflashing with fasteners and neoprene washers or per manufacturer's recommendations.

6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

P. Heat Stack:

1. Minimum stack height is twelve (12) inches.

2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.

3. Prime flange of new sleeve. Install properly sized sleeves set in (¼) inch bed of roof cement.

4. Install base flashing ply in bitumen.

5. Install modified membrane in bitumen.

6. Caulk the intersection of the membrane with elastomeric sealant.

7. Install new collar over cape. Weld collar or install stainless steel draw brand.

3.10 APPLICATION OF SURFACING

A. Aggregate Surfacing:

1. Apply surfacing materials in quantities specified (two hundred (200) lbs. (90.5 kg) per square for white spar). Uniformly embed aggregate in a flood coat of cold process White Star polyurea at a rate of three (3) gallons per square coverage after felt flashings, tests, repairs, and corrective actions have been completed and approved. Broadcast minerals into all bleed out and flashing adhesive.

2. Aggregate shall be dry and placed in a manner required to form a compact, embedded overlay. To aid in proper embedment, lightly roll aggregate provided that there is no damage to the roofing membrane.

B. Reflective Coating:

1. Allow all cold applied mastics and coating to properly dry and cure before installing the Garla Block Primer and White Star Polyurea coating.

2. Paint all exposed membrane with manufacturer's Garla Block primer roof coating installed at a rate of one-half (1/2) gallon per square. Install two (2) gallons per square of White Star Polyurea. Install two (2) gallons/square of White Star Polyurea and broadcast 2lbs per square foot of A1 Grit Glacier into wet coating. Immediately spray another one (1) gallon per square of White Star over the gravel.

C. Mineral Surfaced Membrane System: While bleed out from the side and end laps are still hot, hand broadcast minerals into asphalt bleed out for a monolithic appearance. Apply mineral lap sealant to any areas of improper adherence of minerals and rebroadcast minerals while coating is still wet.

3.11 FIELD QUALITY CONTROL

A. Perform field inspection and testing as required under provisions of Division 01 Section Quality Requirements.

B. Correct defects or irregularities discovered during field inspection.

C. Require attendance of roofing and insulation] materials manufacturers' representatives at site during installation of the roofing system. A copy of the specification should also be on site at all times.

3.12 CLEANING

A. Remove bitumen adhesive drippings from all walls, windows, floors, ladders and

finished surfaces.

B. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this Section, consult manufacturer of surfaces for cleaning instructions and conform to their instructions.

C. Repair or replace defaced or disfigured finishes caused by work of this Section.

3.13 CONSTRUCTION WASTE MANAGEMENT

A. Remove and properly dispose of waste products generated during roofing procedures. Comply with requirements of authorities having jurisdiction.

3.14 FINAL INSPECTION

A. At completion of roofing installation and associated work, meet with CONTRACTOR, ARCHITECT, installer, installer of associated work, OWNER, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.

B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs, and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.

C. The roofing system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the [Roofing] CONTRACTOR.

D. If core cuts verify the presence of damp or wet materials, the [Roofing] CONTRACTOR shall be required to replace the damaged areas at his own expense.

E. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

F. Notify the OWNER upon completion of corrections.

G. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

H. Immediately correct roof leakage during construction. If the CONTRACTOR does not respond within twenty-four (24) hours, the OWNER will exercise rights to correct the Work under the terms of the Conditions of the Contract.

3.15 DEMONSTRATION AND TRAINING

A. At a time and date agreed to by the OWNER, instruct the OWNER'S facility manager, or other representative designated by the OWNER, on the following procedures:

1. Roof troubleshooting procedures.

2. Notification procedures for reporting leaks or other apparent roofing problems.

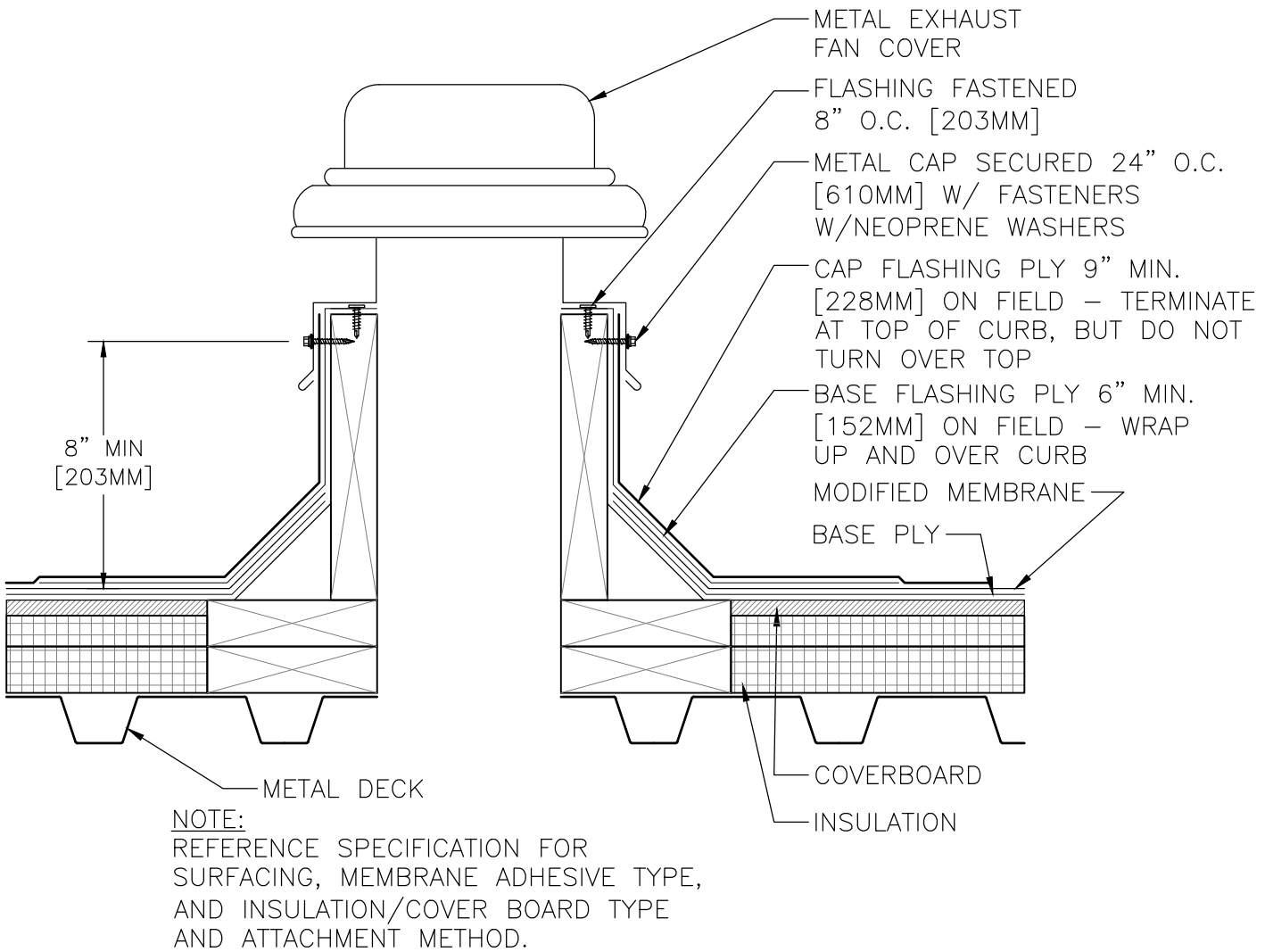
3. Roofing maintenance.

4. The OWNER'S obligations for maintaining the roofing warranty in effect and force.
5. The Manufacturer's obligations for maintaining the roofing warranty in effect and force.

END OF SECTION 07 52 00

Roofing Details 07 52 00

Exhaust Fan
Hatch
Pipe Housing
Equipment Curbs



NOTE:
REFERENCE SPECIFICATION FOR SURFACING, MEMBRANE ADHESIVE TYPE, AND INSULATION/COVER BOARD TYPE AND ATTACHMENT METHOD.

Additional Roofing Detail Drawings (sheet 1 of 4) - Addendum No. 4

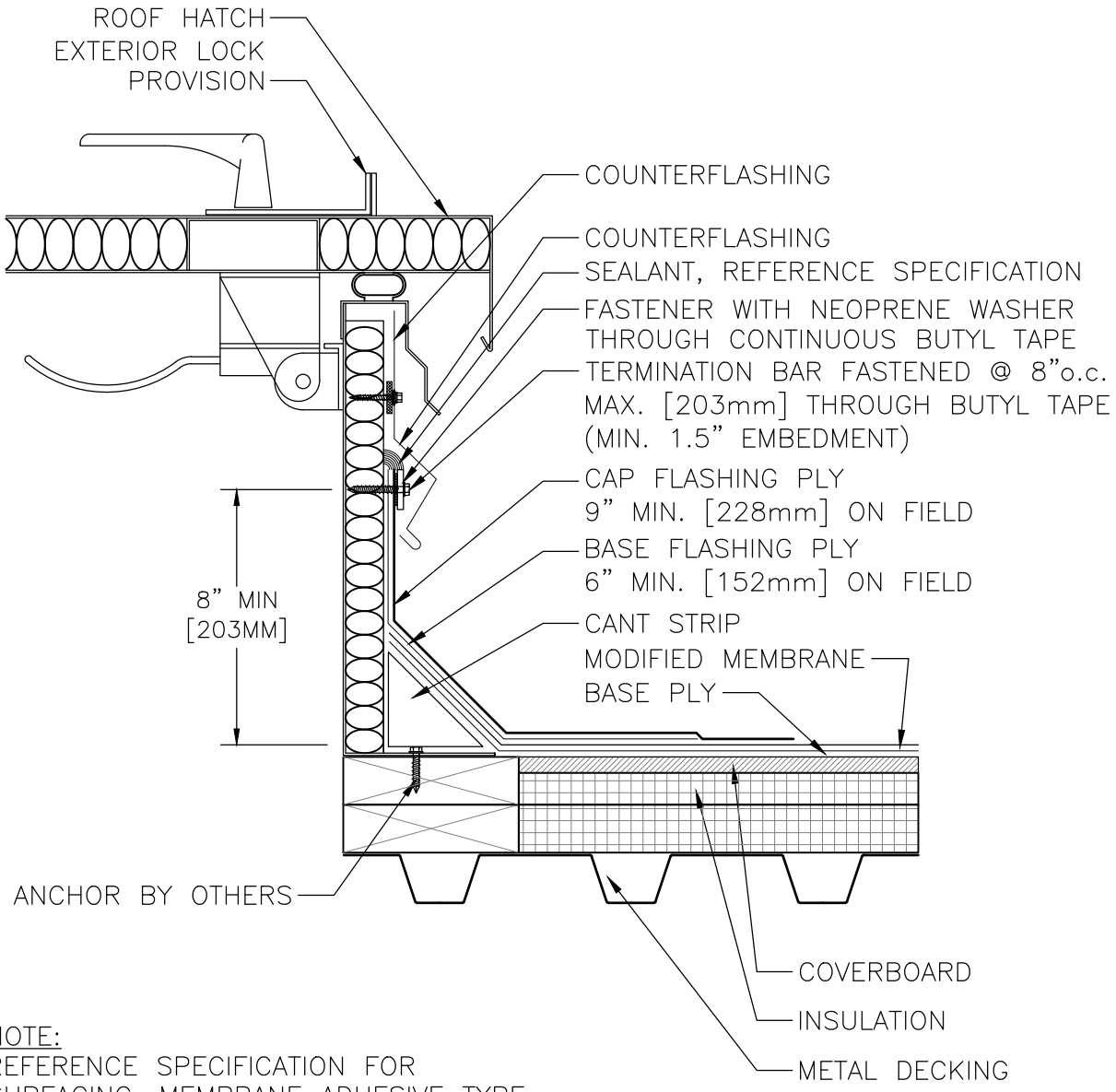
DRAWINGS ON 8½"x11 TITLE BLOCKS ARE NOT TO SCALE.

EXHAUST FAN

THE GARLAND COMPANY, INC.
GARLAND CANADA, INC.
THE GARLAND COMPANY UK, LTD

since 1895

PROJECT:	
CUSTOMER:	
ARCHITECT:	
REPRESENTATIVE:	
DATE:	SHT: OF



NOTE:
REFERENCE SPECIFICATION FOR SURFACING, MEMBRANE ADHESIVE TYPE, AND INSULATION/COVER BOARD TYPE AND ATTACHMENT METHOD.

DRAWINGS ON 8½"x11 TITLE BLOCKS ARE NOT TO SCALE.

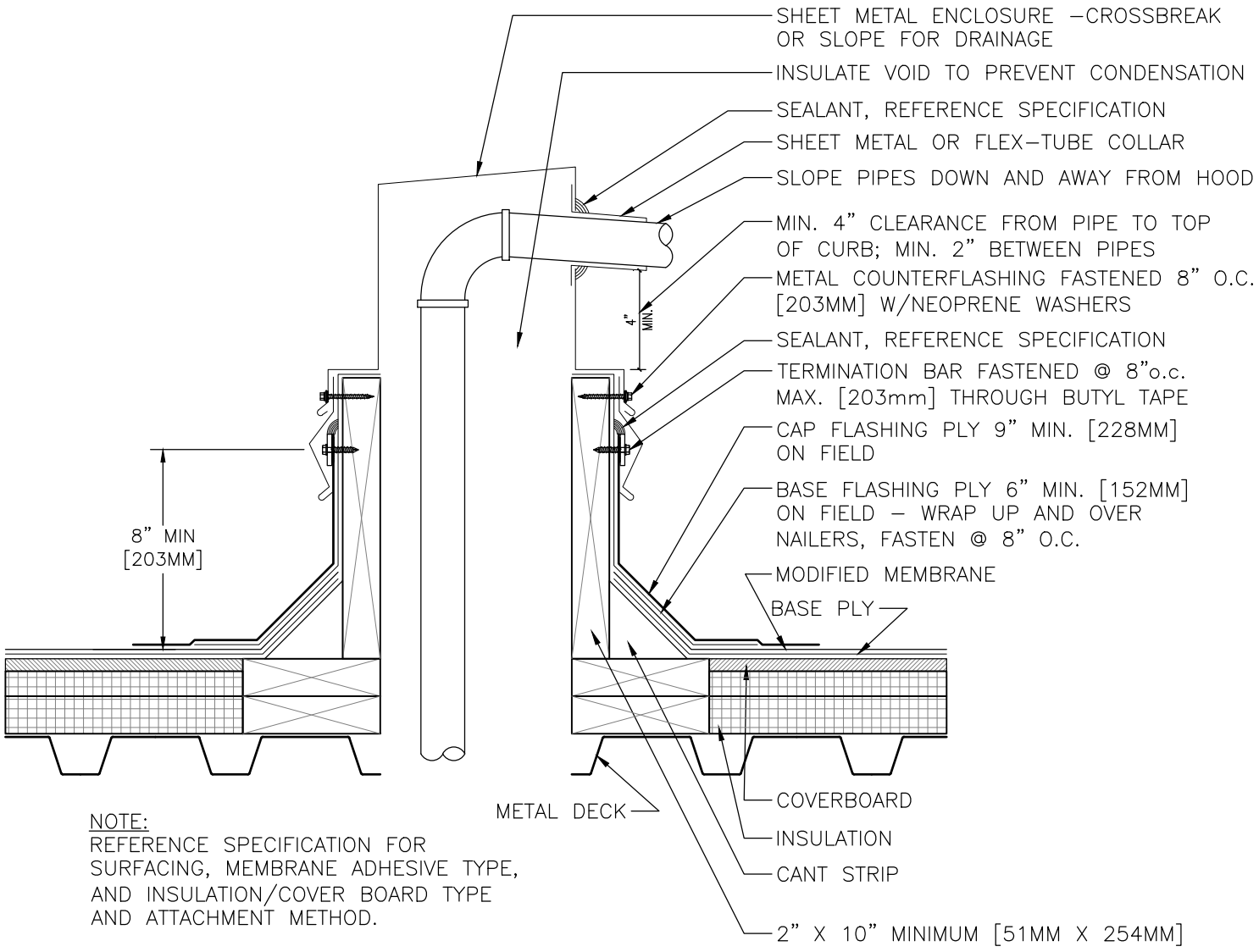
Additional Roofing Detail Drawings (sheet 2 of 4) - Addendum No. 4

HATCH DETAIL

THE GARLAND COMPANY, INC.
GARLAND CANADA, INC.
THE GARLAND COMPANY UK, LTD

since 1895

PROJECT:	
CUSTOMER:	
ARCHITECT:	
REPRESENTATIVE:	
DATE:	SHT: OF



NOTE:
REFERENCE SPECIFICATION FOR SURFACING, MEMBRANE ADHESIVE TYPE, AND INSULATION/COVER BOARD TYPE AND ATTACHMENT METHOD.

Additional Roofing Detail Drawings (sheet 3 of 4) - Addendum No. 4

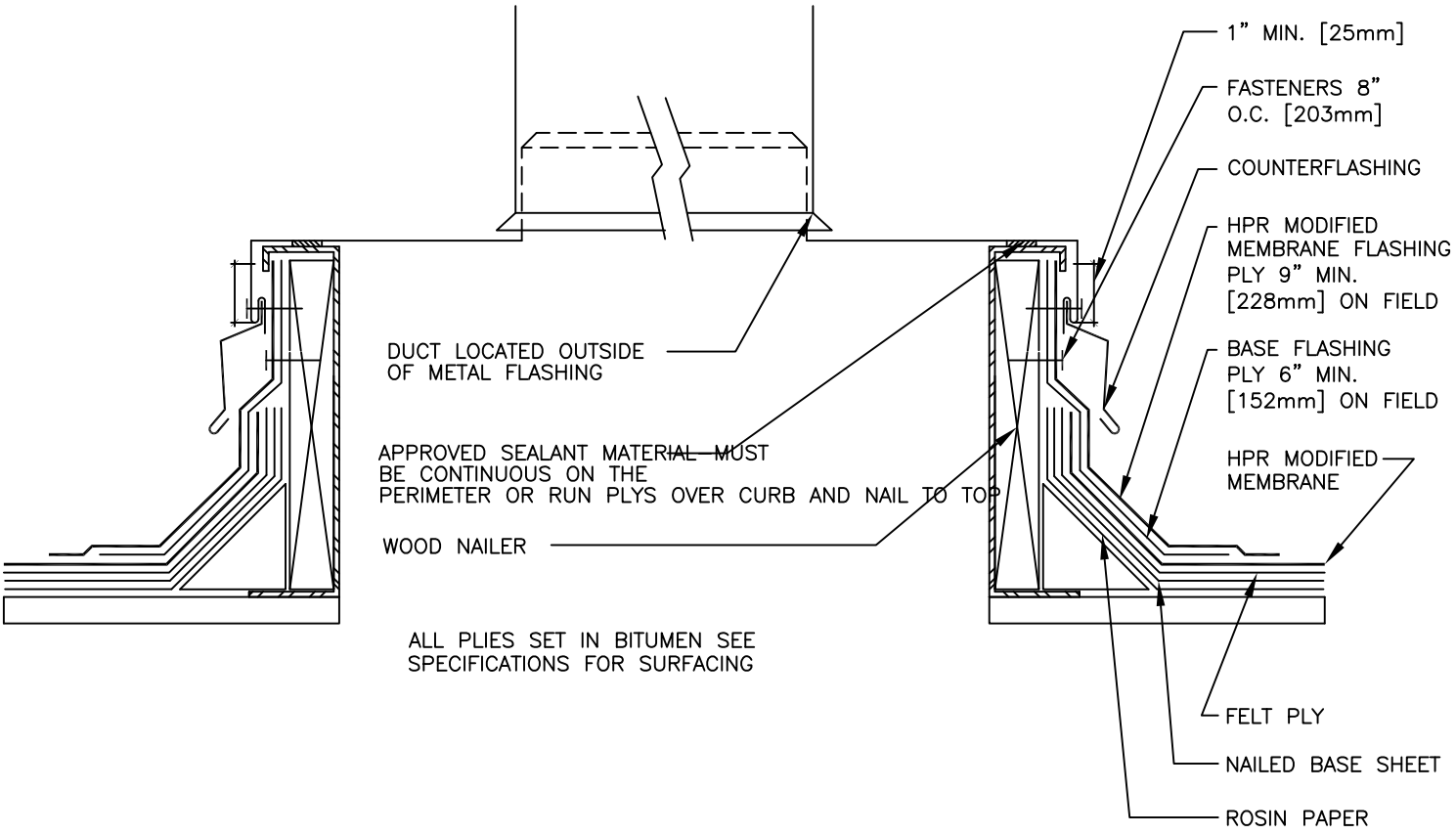
DRAWINGS ON 8½"x11 TITLE BLOCKS ARE NOT TO SCALE.

PIPE HOUSING

GARLAND
since 1895

THE GARLAND COMPANY, INC.
GARLAND CANADA, INC.
THE GARLAND COMPANY UK, LTD

PROJECT:	
CUSTOMER:	
ARCHITECT:	
REPRESENTATIVE:	
DATE:	SHT: OF



Additional Roofing Detail Drawings (sheet 4 of 4) - Addendum No. 4

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DETAIL:

CURB DETAIL / HANDLING STATION

2 PLY-COLD

SECTION 07 6000

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sheet metal flashings in connection with roofing.

2. Reglet and counter flashing assemblies.

3. Miscellaneous metal flashing and counter flashing as required, except where provided under Divisions 22, Plumbing, 23, HVAC, or 26, Electrical.

4. Coping caps.

5. Gravel stops and metal edging.

6. Gutters and downspouts.

8. Splash pans where downspouts empty onto roofing.

7. Conductor heads.

8. Drip flashings.

9. Sheet metal covering at outside storage units.

10. Sheet metal wall coverings.

11. Roof pipe flashings.

12. Roof expansion joint covers.

13. Other sheet metal items, not necessarily specified herein or in other sections, but required to prevent penetration of water into building.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 07 7100 - Roof Specialties.

3. Section 07 9200 - Joint Sealants.

4. Section 09 2423 - Cement Plaster and Metal Lath

5. Division 22 - Plumbing.

6. Division 23 - HVAC.

7. Division 26 - Electrical.

1.02 SUBMITTALS

A. Shop Drawings: Submit for fabricated sheet metal indicating shapes, details, methods of joining, anchoring and fastening, thicknesses and gages of metals, concealed reinforcement, expansion joint details, sections, and profiles.

B. Samples: Submit Samples for materials or assemblies as requested.

C. Product Data: Submit brochures of manufactured items.

1.03 QUALITY ASSURANCE

A. Drawings and requirements specified govern. Provide the Work of this section in conformance with the Architectural Sheet Metal Manual published by SMACNA for conditions not indicated or specified and for general fabrication of sheet metal items.

B. Materials shall conform to following standards:

1. ASTM A653 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. Pre-installation Meetings: Refer to Division 07 roofing sections as appropriate. Attend the pre-installation and inspection meetings for roofing Work.

1.04 DELIVERY, STORAGE AND HANDLING

A. Do not install bent or otherwise damaged materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Galvanized Sheet Steel: ASTM A653, coating designation G90, hot-dip galvanized.

B. Fastenings:

1. Galvanized Steel: Nails, rivets, and other fastenings furnished in connection with galvanized sheet steel Work shall be sealed with rust resistive coating. Rivets shall be tinned. Nails and other fastenings shall be zinc-coated.

C. Soldering Flux: Raw muriatic acid for galvanized steel; rosin for tin, lead and tinned copper; non-corrosive soldering salts for uncoated copper and acid-type flux formulated for soldering stainless steel.

D. Solder: ASTM B32, Grade 5A, composed of 95-5 tin-antimony. Name of product manufacturer and grade designation shall be labeled, stamped or cast onto each coil or bar.

2.02 FABRICATION

A. General:

1. Accurately form sheet metal Work to dimensions and shapes indicated and required. Cope finish molded and brake metal shapes with true, straight, sharp lines and angles and, where intersecting each other, to a precise fit. Unless otherwise specified, all galvanized sheet steel shall be 22 gage. Exposed edges of sheet metal shall have a ½ inch minimum hemmed edge.

2. Soldering of sheet steel or copper shall be performed with well-heated copper soldering iron or soldering torch, joints full flowing, neat and consistent. Fill joint completely with solder. Clean materials at joints before soldering, and tin

coppers before soldering. Exposed soldering on finished surfaces shall be scraped smooth. Lock seam work shall be fabricated flat and true to line and soldered along its entire length. Acid-fluxed Work shall be neutralized after fabrication.

3. Form and install sheet metal Work to provide proper allowances for expansion and contraction, without causing undue stresses in any part of completed Work. Installation shall be water and weathertight.

B. Gutters and Downspouts:

1. Gutters: Fabricate from 22 gage galvanized steel to match existing size and design unless otherwise indicated. Maximum length of gutter shall be 40 feet between end or expansion joints unless the system is specially designed to accommodate the greater expansion, the larger flow and the need for special supports. Drain gutter towards nearest downspout and provide an expansion joint at mid-point between downspout outlets, but not to exceed 40 feet on center. Gutters shall not pond water. Rivet joints and ends with a minimum of 6 rivets per joint or maximum rivet spacing not to exceed 1 ½-inch on center and ½ inch from the edge of the metal, consisting of 3-inch overlap. Sweat solder from inside of gutter and in horizontal position where possible. Neatly fit downspouts to gutter using a slip joint. Provide expansion joints, consisting of 3-inch lap joints at not over feet.

2. Form and install sheet metal Work to provide allowance for expansion and contraction without causing undue stresses in the completed Work.

3. Downspouts: Fabricate downspouts from 3-inch round, or 3-inch by 4-inch rectangular shapes, 16 gage steel tubing with butt joints and mitered elbows, sized as indicated. Downspouts shall be constructed with conductor heads every 40 feet to admit air and prevent vacuum. Keep downspouts offsets to a maximum of 10 feet. Downspout shall be fabricated with elbows at bottom discharge or connected to drains as indicated. Joints, except expansion joints shall be sealed with a continuous weld. Galvanize downspouts after fabrication.

4. Outlets: Fabricate outlets of 22 gage galvanized sheet steel with a 1/4 inch rolled flanged soldered continuously to gutter. Outside diameter shall be 1/8 inch less than the inside diameter of the downspout and extend into downspout 4 inches. Install a removable wire “bulb type” strainer to outlet opening. Strainer shall be fabricated of 22 gage galvanized steel and ½ inch hardware cloth.

C. Conductor Heads:

1. Fabricate conductor heads and outlets from 22 gage galvanized sheet steel. Cover tops of the conductor heads with 22 gage galvanized ¼ inch wire mesh soldered securely to separately fabricated frame and mechanically fastened to top conductor head with a minimum of two fasteners.

D. Gravel Stops: Provide 24 gage galvanized sheet steel gravel stops wherever roof area drops to a lower level; at the eaves and rake of roof, where roof comes to an abrupt edge, and where indicated. Stops shall be of height indicated and shall be fabricated with two flanges. Horizontal flange shall be not less than 4 inches wide, and vertical flange shall extend down over vertical surfaces of trim or gutter. Gravel stops shall lap 4 inches at ends and corners, and shall be fabricated by notching and interlocking vertical face flanges. Contact surfaces of lapped flanges, including raised areas, vertical face and corners, shall be completely covered with flashing compound. Fabricate lap joints so that

they will be in the direction of water flow. Where flanges are over five inches wide, provide 20 gage continuous cleats fastened at 24 inches on center.

E. Overflow Outlets: Provide galvanized sheet steel overflow outlets at locations and of sizes indicated. Outlets shall extend through full thickness of wall in one continuous piece and completely line the opening. On outside face of wall, top and sides of outlet shall finish 1/2 inch on surface of wall. Bottom of outlet shall project 1 ½ inches beyond face of wall, and shall be bent down slightly. Outlets shall be sealed on the surface of the building. On inside face, side and bottom flanges shall extend not less than 8 inches beyond edge of opening, and not less than 6 inches at top. Outlets shall be installed at time roof is being installed.

F. Reglet Type Counterflashing: Where roof comes in contact with vertical surfaces, provide counterflashing. Set top of counter flashing 8 inches above roof deck unless otherwise indicated, and extend down at least 5 inches or to top of cant strip. Counterflashing and reglet shall be 22 gage galvanized sheet steel. Lap counter flashing and reglet 3 inches minimum at splices and miter at angles, or supply special metal corner fittings. Reglet and method of securing flashing shall be so constructed that flashing is firmly locked in place, but may be readily removed for replacement.

G. Splash Pans: Provide splash pans for all downspouts, which empty onto lower roofs. Pans shall be galvanized sheet steel 12-inch by 18-inch, unless otherwise indicated, and turned up 2 inches on at least three sides.

H. Roof Expansion Joint Covers: Fabricate of 22 gage galvanized sheet steel, as detailed. One side of joint shall be zee shaped, with 3-inch standing leg extended over the joint and turned down. The other side shall be box shaped, fabricated to extend over the joint, over the standing leg, and turn down to form a water barrier. Prefabricated bellows type joint covers are not permitted.

I. Miscellaneous Flashing: Unless otherwise indicated, miscellaneous flashing shall be fabricated of galvanized steel. Exterior doors and windows, unless covered by overhangs shall be provided with 22 gage galvanized steel drip flashing as detailed. At wood construction, nail flashing to framing before paper backed lath is installed.

J. Roof Pipe Flashings: Provide PVC flashings or prefabricated welded or seamless flashings.

PART 3 - EXECUTION

3.01 PREPARATION

A. Concrete and masonry materials in contact with sheet metal shall be painted with alkali resistant coating, such as heavy-bodied bituminous paint. Wood in contact with sheet metal shall be painted with two coats of aluminum paint or one coat of heavy-bodied bituminous paint.

3.02 INSTALLATION

A. General: Coordinate with installation of underlayment indicated in the Drawings and specified in Section 09 2423.

B. Gutters and Downspouts:

1. Anchor gutters to structure with 10 gage steel straps, galvanized after fabricating. Secure straps with galvanized fasteners at 3 feet on center. Drill pilot holes and use 12 by 2-inch pan head screws.

2. Install 1/4 inch galvanized wire mesh continuous cover on gutter.

3. Secure downspouts to walls with 1/8 inch by 2-inch galvanized steel straps. Straps shall be located at top, bottom, and at not over 10 feet on center. Block downspouts out ½ inch from the finish wall surfaces and 1 inch from the bottom of downspout grade. Secure straps to wall framing with 1/4 inch by 2-inch long galvanized anchors. Expansion type anchors shall be provided when anchoring to concrete and masonry. Provide toggle bolts for attachment to masonry or plaster. At steel columns, provide fasteners as indicated. Plastic anchors are not permitted.

4. Anchor conductor heads to walls with 1/4 inch diameter by 2 ½-inch long galvanized lag screws or 1/4 inch expansion type anchors.

C. Reglets: Install reglets at constant height above cant or as indicated. Provide minimum 3-inch lap at end splices of reglets. Seal laps watertight.

D. Counterflashing:

1. Install at constant horizontal elevation across roof slope and slope at constant height above cant or as indicated.

2. Provide minimum 3-inch lap at all end splices of counterflashing.

E. Galvanized sheet steel parapet coping and flashing shall be continuous over top of parapet to form a watertight cap, with waterproof seams at approximately 10 feet on center, or as indicated. Anchor coping to outside of wall with a continuous cleat face nailed at 24 inch centers. Coping shall be fastened on inside wall with hex head screws and bonded sealing washers through oversized holes in the back of the coping. Corners and angles shall be lapped and soldered; do not install joint sealant.

3.03 TESTING

A. Perform field water testing to demonstrate installation is watertight. Continue testing with a continuous hose stream applied at base of installation for at least 30 minutes. If leaking is observed, discontinue test and repair installation, then test until satisfactory results are obtained.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.05 CLEANING

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 07 7100

ROOF SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Roof hatches.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 05 5000 – Metal Fabrications.

3. Section 06 1000 - Rough Carpentry.

4. Section 07 6000 - Flashing and Sheet Metal.

1.02 SUBMITTALS

A. Shop Drawings: Submit for fabricated sheet metal indicating details, methods of joining, anchoring and fastening, thicknesses and gauges of metals, concealed reinforcement, sections, and profiles.

B. Samples: Submit Samples for materials or assemblies as requested. Provide finish Samples of exposed items.

C. Product Data: Submit brochures of manufactured items.

D. Installation Instructions: Provide manufacturer's recommended installation methods and instructions for each item. Instructions shall be prepared to indicate exact conditions of roofing, structure and adjoining construction.

1.03 QUALITY ASSURANCE

A. Drawings and requirements specified govern. Provide the Work in accordance with the Architectural Sheet Metal Manual published by SMACNA for conditions not indicated or specified and for general fabrication of sheet metal items.

B. Qualifications of Installer: Minimum 5 years experience in successfully installing the same or similar sheet metal specialties on roofing systems similar to the roofing systems specified.

C. Coordinate opening sizes and installation with roofing and related Work to ensure fit and installation.

D. Pre-installation Meetings: Refer to Division 07 roofing sections as appropriate. Attend the pre-installation and inspection meetings for roofing Work.

1.04 DELIVERY, STORAGE AND HANDLING

A. Protect roof specialties and accessories by storing above grade on required skids or supports. Protect from physical damage and do not install bent or damaged materials.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Roof Hatches:

1. Babcock Davis.
2. Bilco Company.
3. Lane-aire Model CRH.
4. Dur-Red Products.
5. Equal.

2.02 PRODUCTS

A. Roof Hatches: Provide roof hatches of indicated sizes. Hatches shall be fabricated of galvanized steel, 14 gage curb and cover, 22 gage cover liner, and 1 inch thick insulation in cover and curb. Cover shall operate by a compression spring enclosed in a telescopic case or enclosed torsion spring, with automatic hold-open arm. Provide padlock hasp on inside of unit.

1. Accessories: Provide manufacturers fixed hatch railing system, providing a permanent means of fall protection for roof hatch openings. Rail system shall meet OSHA Standard 29 CFR 1910.23(a)(3).
2. Refer to Section 05 5000, Metal Fabrications, for ladder extensions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrate to receive roofing accessories and associated Work and conditions under which accessories will be installed. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install roof accessories in accordance with SMACNA and manufacturer's recommendations as required.

3.03 FIELD QUALITY CONTROL

A. Upon request of the Project Inspector, perform field water testing to demonstrate that installation is watertight. Continue testing with a continuous hose stream applied at base of installation for at least 30 minutes. If leaking is observed, discontinue test and repair installation, then test until satisfactory results are obtained.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.05 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 07 7200 ROOF ACCESSORIES
SMOKE VENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Smoke Vents for emergency heat and smoke removal.

1.2 RELATED REQUIREMENTS

A. Division 05 for ladders and stairs.

B. Division 07 for roofing and sealants.

1.3 COORDINATION

A. Coordinate layout and installation of smoke vents with roofing membrane and base flashing and interfacing and adjoining construction to provide a watertight installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

A. Shop Drawings: Indicate configuration and dimensions, show components, adjacent construction, required clearances and tolerance and other affected work.
1. Vent Units: Show types, elevations, thickness of metals, and full size profiles.
2. Hardware: Show materials, finishes, locations of fasteners, types of fasteners, locations and types of operating hardware, and details of installation.
3. General: Show connections of units and hardware to other work. Include schedules showing location of each type and size of unit.

B. Product Data: Manufacturer’s technical data for each type of hatch assembly, including setting drawings, templates, finish requirements, and details of anchorage devices.
1. Include complete schedule, types, locations, construction details, finishes, latching or locking provisions, and other pertinent data.

1.5 INFORMATIONAL SUBMITTALS

A. Provide manufacturer's standard warranty.

B. Sustainable Design Submittals:
1. Building Product Disclosure Requirements: To encourage the use of building products that are working to minimize their environmental and health impacts, provide the following information when available:
a. Material Ingredients Documentation demonstrating the chemical inventory of the product

1.6 CLOSEOUT SUBMITTAL

A. Manufacturer's Installation Instructions and Operation & Maintenance: Indicate installation, operation and maintenance requirements and rough-in dimensions.

1.7 QUALITY ASSURANCE

A. Regulatory Requirements:
1. International Building Code for venting requirements
2. IBC Section 410 for Stages and Platforms

3. IBC Section 910 for Factory and Storage occupancies
4. IBC Section 1207 Sound Transmission Class minimum STC 50.
5. Underwriters Laboratories Inc, UL 793 Listed for Heat and Smoke Vents
6. FM Global, Factory Mutual, FM 4430 Heat and Smoke Vents for Roofs
7. Reference NFPA 204 for general maintenance of smoke vents.
8. ASTM E 90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
9. ASTM E 1332 Standard Classification for Rating Outdoor-Indoor Sound Attenuation

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site ready use.

B. Exercise proper care in handling of Work so as not to disrupt finished surfaces.

C. Store materials under cover in a dry and clean location off the ground.

1.9 WARRANTY

A. Provide manufacturer's standard 5 year warranty. Smoke vents shall be free from manufacturing defects in materials and fabrication for a period of 5 years from the date of shipment. Should a product fail to function in normal use within this period, manufacturer shall furnish a replacement or new part at Nystrom's discretion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Nystrom
9300 73rd Avenue N
Minneapolis, MN 55428
Phone: (800) 547-2635
www.nystrom.com

2.2 ACOUSTICAL STC48 SMOKE VENTS

A. Type and Size: Acoustical Smoke Vents, AcousticMAX SV, rated per ASTM E 90 and OITC rated per ASTN E 1332.
1. Performance:
   a. Certification: Smoke vent to have official UL label for testing to UL 793 Smoke and Heat Vents
   b. STC Rating: STC 50 - OITC 47, model SVZ Rated per ASTM E 90 and OITC rated per ASTM E 1332.
   c. Loads: 40-lbf/sq. ft. live load with a maximum deflection of 1/150th of the span; 90 lbf/sq. wind uplift.
   d. When release is actuated, lid shall open against 10-lbf/sq. ft. snow or wind load and lock in position.
2. Door Options:
   a. Double Door: Size as indicated on Drawings

3. Hatch Material:
   a. Cover: STC 50 - OITC 47 0.1046-inch galvanneal steel cover and liner.
   b. Cub and Cover Insulation: STC 50 - OITC 47, 4 inch Mineral Wool insulation with sound mat contained within **4-1/4 inch** thick covers, providing total thermal resistance of R-16.8
   c. Curb: **STC 50 - OITC 47 0.1046-inch** galvanneal steel curb. 12-inch high double wall curb with EZ tab counterflashing and 5-1/2 inch mounting flange with 1/2 inch diameter holes.

4. Finish:
    a. Cover Exterior: [High Reflectance White powder coat steel] [ANSI 70 powder coat steel] [As selected by Architect from manufacturer's full range] <Insert color>
    b. Cover Interior: Black powder coat finish.
    c. Curb: Black powder coat finish.
    d. Latch: Positive hold zinc plated steel rotary latch Upon latch releases, vent covers are closed manually at rooftop level.
5. Latch: Positive hold zinc plated steel rotary latch. Upon latch releases, vent covers are closed manually at rooftop level
    a. Latch released manually via internal and external pull handles with cables.
    b. Latch released automatically by UL 33 listed fusible melt-out link at temperature of 212 deg F.
    c. Options and Accessories

B. Options and Accessories
    a. Fall Protection Security Mesh: 3/16 inch diameter steel rod, 4 inch by 4 inch spacing, securely attached to inside of curb.
    b. Manual Winch: Operation allowing remote closing of smoke vent from the floor area.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.

B. Verify that deck, curbs, roof membrane, base flashing, and other items affecting Work of this Section are in place and positioned correctly.

C. Verify tolerances and correct improper conditions.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install roof accessory items and components per manufacturer's instructions.

B. Coordinate installation of components of this Section with installation of roof deck, roof structure, roofing membrane, and base flashing.

C. Coordinate installation of sealant and roofing cement with Work of this Section to ensure water tightness.

D. Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.

E. Flange Seals: Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a seal.

3.3 FIELD QUALITY CONTROL

A. Smoke Vent Testing: Test for proper operation after installation by one or all the operational methods:
1. Melting fusible link for inside at smoke vent level recommend using handheld propane tank torch. Replace fusible link, then close vents from the exterior at the roof top level.
2. Pull internal and/or external manual pull handles, then close vents from the exterior at the roof top level.

3. If applicable; open the vents using an electrical signal for fire alarm, push button or other, then close vent from the exterior at the roof top level.

B. Do not paint the internal mechanisms, especially moving parts such as spring/dampers, rotary latches and especially the fusible links. Painting any of these components may damage the vents and will void the warranty.

3.4 ADJUSTING

A. Adjust movable parts for smooth operation.

B. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.5 CLEANING

A. Clean exposed surfaces per manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION

SECTION 07 9200

JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Joint sealants.
2. Preparation for application of sealants.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Division 07 – Thermal and Moisture Protection.
3. Division 08 - Openings.
4. Division 09 - Finishes.
5. Section 10 2813 - Toilet Accessories.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating sealant joint locations, with full-size sealant joint details.

B. Product Data: Submit manufacturer's literature for each sealant material.

C. Material Samples: Submit Samples indicating color range available for each sealant material intended for installation in exposed locations.

D. Certifications: Submit manufacturer’s certification materials comply with requirements specified.

E. Site Samples: At locations required, provide a Sample of sealant for each typical installation, approximately 24 inches long, including joint preparation, backing, sealant and tooling. Allow backing to extend 6 inches beyond end of sealant for inspection of substrate.

F. Test Reports: Submit manufacturer's adhesion compatibility test reports according to ASTM C794 for each substrate.

1.03 QUALITY ASSURANCE

A. Qualifications of Installer: The Work of this section shall be installed by a firm which has been in the business of installing similar materials for at least five consecutive years; and can show evidence of satisfactory completion of five projects of similar size and scope. Installer shall have applicators trained and approved by manufacturer for performing this Work.

1.04 DELIVERY, STORAGE AND HANDLING

A. Store in accordance with manufacturer’s recommendations. Provide a uniform ambient temperature between 60 and 80 degrees F.

1.05 WARRANTY

A. Manufacturer: five year material warranty.

B. Installer: two year installation/application warranty.

PART 2 - PRODUCTS

2.01 GENERAL

A. Furnish sealants meeting following in-service requirements:

1. Normal curing schedules are permitted.

2. Non-staining, color fastness (resistance to color change), and durability when subjected to intense actinic (ultraviolet) radiation are required.

B. Furnish the products of only one manufacturer unless otherwise required, sealant colors as selected to match the adjoining surfaces.

2.02 MATERIALS

A. Sealants:

1. Sealant 1: Acrylic latex, one-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C834, Type S, Grade NS, formulated to be paintable.

a. Tremco Inc., Acrylic Latex Caulk.
b. Pecora Corporation, AC-20.
c. Equal.

2. Sealant 2: Butyl sealant, one-part, non-sag, solvent-release-curing sealant complying with ASTM C1311, gun grade and formulated with a minimum of 75 percent solids.

a. Tremco Inc., Tremco Butyl Sealant.
b. Pecora Corp., BC-158.
c. Equal.

3. Sealant 3: Silicone sealant, one-part non-acid-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.

a. Dow Corning Corp., Dow Corning 790, 791, 795.
b. General Electric Co., Silpruf.
c. Tremco, Inc., Spectrem 1.
d. Pecora Corp., 864.
e. Equal.

4. Sealant 4: One-part mildew-resistant silicone sealant, complying with ASTM C920, Type S, Grade NS, Class 25.

a. Dow Corning Corp., Dow Corning 786.
b. General Electric Co., Sanitary 1700.
c. Tremco, Inc., Proglaze White.
d. Equal.

5. Sealant 5: One-part non-sag urethane sealant, complying with ASTM C920, Type S, Grade NS, Class 25.

   a. Sika Corporation, Sikaflex -221e.
   b. Equal.

6. Sealant 6: Multi-part pouring urethane sealant, complying with ASTM C920, Type M, Grade P, Class 25.

   a. Sika Corporation, Sikaflex 2C NS/SL.
   b. Equal.

7. Sealant 7: Acoustical sealant, non-drying, non-hardening permanently flexible conforming to ASTM D217.

   a. Pecora Corp., BA-98 Acoustical Sealant.
   b. Equal.

B. See 07 8413 - Penetration Firestopping for rated sealants.

C. Joint Backing: ASTM D1056; round, closed cell Polyethylene Foam Rod; oversized 30 to 50 percent larger than joint width, reticulated polyolefin foam.

D. Primer: Non-Staining Type. Provide primer as required and shall be product of manufacturer of installed sealant.

E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer.

F. Sealants shall have normal curing schedules, shall be nonstaining, color fast and shall resist deterioration due to ultraviolet radiation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that joint openings are ready to receive Work and field tolerances are within the guidelines recommended by sealant manufacturer.

3.02 SURFACE PREPARATION

A. Joints and spaces to be sealed shall be completely cleaned of all dirt, dust, mortar, oil, and other foreign materials which might adversely affect sealing Work. Where necessary, degrease with a solvent or commercial degreasing agent. Surfaces shall be thoroughly dry before application of sealants.

B. If recommended by manufacturer, remove paint and other protective coatings from surfaces to be sealed before priming and installation of sealants.

C. Preparation of surfaces to receive sealant shall conform to the sealant manufacturer's specifications. Provide air pressure or other methods to achieve required results. Provide masking tape to keep sealants off surfaces that will be exposed in finished Work.

D. Etch concrete or masonry surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.

E. Perform preparation in accordance with ASTM C804 for solvent release sealants, and ASTM C962 for elastomeric sealants.

F. Protect elements surrounding Work of this section from damage or disfiguration.

3.03 SEALANT APPLICATION SCHEDULE

	Location	Type	Color
A.	Exterior and Interior joints in horizontal surfaces of concrete; between metal and concrete masonry and mortar.	Sealant 6	To match adjacent material
B.	Exterior door, entrance and window frames. Exterior and interior vertical joints in concrete and masonry metal flashing.	Sealant 3 or 5	To match adjacent material
C.	Joints within glazed curtain wall system. Skylight framing system. Aluminum entrance system glass and glazing.	Sealant 3	Translucent or Black
D.	Interior joints in ceramic tile and at plumbing fixtures.	Sealant 4	Translucent or White
E.	Under thresholds.	Sealant 2	Black
F.	All interior joints not otherwise scheduled	Sealant 1	To Match Adjacent Surfaces
G.	Heads and sills, perimeters of frames and other openings in insulated partitions	Sealant 7	Match Adjacent Surfaces

3.04 APPLICATION

A. Provide sealant around all openings in exterior walls, and any other locations indicated or required for structure weatherproofing and/or waterproofing.

B. Sealants shall be installed by experienced mechanics using specified materials and proper tools. Preparatory Work (cleaning, etc.) and installation of sealant shall be as specified and in accordance with manufacturer's printed instructions and recommendations.

C. Concrete, masonry, and other porous surfaces, and any other surfaces if recommended by manufacturer, shall be primed before installing sealants. Primer shall be installed with a brush that will reach all parts of joints to be filled with sealant.

D. Sealants shall be stored and installed at temperatures as recommended by manufacturer. Sealants shall not be installed when they become too jelled to be discharged in a continuous flow from gun. Modification of sealants by addition of liquids, solvents, or powders is not permitted.

E. Sealants shall be installed with guns furnished with proper size nozzles. Sufficient pressure shall be furnished to fill all voids and joints solid. In sealing around openings, include entire perimeter of each opening, unless indicated or specified otherwise. Where gun installation is impracticable, suitable hand tools shall be provided.

F. Sealed joints shall be neatly pointed on flush surfaces with beading tool, and internal corners with a special tool. Excess material shall be cleanly removed. Sealant, where exposed, shall be free of wrinkles and uniformly smooth. Sealing shall be complete before final coats of paint are installed.

G. Comply with sealant manufacturer's printed instructions except where more stringent requirements are indicated on Drawings or specified.

H. Partially fill joints with joint backing material, furnishing only compatible materials, until joint depth does not exceed 1/2 inch joint width. Minimum joint width for metal to metal joints shall be 1/4 inch. Joint depth, shall be not less than 1/4 inch and not greater than 1/2 inch.

I. Install sealant under sufficient pressure to completely fill voids. Finish exposed joints smooth, flush with surfaces or recessed as indicated. Install non-tracking sealant to concrete expansion joints subject to foot or vehicular traffic.

J. Where joint depth prevents installation of standard bond breaker backing rod, furnish non-adhering tape covering to prevent bonding of sealant to back of joint. Under no circumstances shall sealant depth exceed 1/2 inch maximum, unless specifically indicated on Drawings.

K. Prime porous surfaces after cleaning. Pack joints deeper than 3/4 inch with joint backing to within 3/4 inch of surface. Completely fill joints and spaces with gun applied compound, forming a neat, smooth bead.

3.05 MISCELLANEOUS WORK

A. Sealing shall be provided wherever required to prevent light leakage as well as moisture leakage. Refer to Drawings for condition and related parts of Work.

B. Install sealants to depths as indicated or, if not indicated, as recommended by sealant manufacturer but within following general limitations:

1. For joints in concrete walks, slab and paving subject to traffic, fill joints to a depth equal to 75 percent of joint width, but not more than 3/4 inch deep or less than 3/8 inch deep, depending on joint width.

2. For building joints, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.

3.06 CLEANING

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.07 CURING

A. Sealants shall cure in accordance with manufacturer's printed recommendations. Do not disturb seal until completely cured.

3.08 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 08 1113

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 1 - General Requirements apply to this section.

B. Section Includes:

1. Steel doors and frames as indicated.

C. Related Sections:

1. Section 04 2200: Concrete Unit Masonry
2. Section 07 9200: Joint Sealants.
3. Section 08 7100: Door Hardware.
4. Section 08 8000: Glass and Glazing.
5. Section 09 9113: Exterior Painting
6. Section 09 9123: Interior Painting.

1.02 SYSTEM DESCRIPTION

A. Design Requirements: Drawings indicate profile and general details of steel frame fabrication and installation, in addition to referenced details 1, 2, 3 and 3A this section.

B. Regulatory Requirements: Comply with CBC Standard 7-2 requirements for positive pressure smoke testing.

1.03 SUBMITTALS

A. Shop Drawings:

1. Submittal to include elevations of each hollow metal door type, details of each frame type, location schedule of doors, and frames indicating the same reference for details and openings as indicated on the Drawings, conditions of openings of various wall sections and materials, typical and special details of construction, methods of assembling sections, location and installation requirements for hardware, material size, shape, and thickness, and all joints and connections.

2. Submit composite Shop Drawings indicating detailed relationships of installation including the Work of adjacent construction, finish hardware, security, fire, and life safety devices, glazing, caulking, and requirements for field installation.

C. Product Data: Submit manufacturer's Product Data indicating composition and construction for each fabricated item including louvers, coatings, finishes, and other components.

D. Certification: Submit to indicate compliance with specified criteria, including fabrication and required fire rating.

E. Samples:

1. Hollow Metal Frame: Corner section of typical interior frame, of sufficient composite size to illustrate corner joint, hinge reinforcement, closer re-enforcement, floor anchor, dust cover, and jamb anchors.

2. Hollow Metal Door: Section of typical interior door of sufficient composite size to illustrate edge, top, bottom, and core construction, hinge reinforcement and face stiffening, closer reinforcement and kick plate reinforcement, and corner of vision opening construction with glazing beads.

F. Job Close-out: Provide one (1) complete manufacturer's Catalog to the District Lockshop.

G. Submission of all materials proposed for use shall be per Section 38 of the Construction Services Agreement.

1.04 QUALITY ASSURANCE

A. Steel doors and frames shall be the product of one manufacturer.

B. Coordinate with hardware supplier for fabrication of doors and frames to receive hardware items.

C. References: Work not subject to more stringent provisions of regulatory agencies and the Contract Documents shall satisfy as a minimum the requirements of:

1. Fire-rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated doors and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows", and have been tested, listed, and labeled in accordance with ASTM E152 "Standard Methods of Fire Test of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction. Do not modify or perform field changes to labeled doors or frames to violate the terms and conditions of the specified listing and/or cause voiding of the listing.

2. ANSI/SDI-100: Steel Door Institute, Recommended Specifications Standard Steel Doors and Fames.

3. U.L.: Underwriters Laboratories, Inc.

4. AISI: American Iron and Steel Institute.

5. NAAMM HMM: Specifications for Custom Hollow Doors & Frames by National Association of Architectural Metal Manufacturers.

D. Standards of Manufacturer and Workmanship:

1. Finished Work shall be of uniform profile, accurately fabricated, rigid and strong, square and true, neat in appearance, smooth and free from dents, waves, warps, buckles, open joints, tool marks and/or other defects.

2. Construction joints shall be flush, tight and welded their full length, ground flush and smooth on exposed surfaces.

3. All frame and door reinforcing and hardware provisions shall be performed in the fabrication shop. Provide all cuts, welds, and other fabrications before galvanizing or shop priming.

4. Lines and molded members shall be straight and true with angles as sharp as practical for thickness involved, surfaces flat, and fastenings concealed.

5. Tolerances: Fabricate doors and/or frames to provide a maximum 1/8" gap between side edges of door face and frame after installation, a maximum of 1/8" at top edge, and maximum ¼" clearance above finish floor, except as otherwise required by floor finish material. Provide maximum 1/8" gap between door edges adjoining stiles or at astragals.

E. Hollow metal manufacturer shall have both their fabrication and assembly plant(s) located within the continental United States. Products that are either fabricated or assembled outside the United States will not be acceptable.

F. The hollow metal manufacturer shall supply doors and frames through a national distribution system as described in 1.06. herein. Marketing material through a factory direct method will not be acceptable to the District.

G. Hollow metal supplier shall be a qualified local direct distributor of products to be furnished. The distributor shall have in their regular employment an AHC and/or CDC with a local business address, telephone and fax line, who will be available at reasonable times throughout the project to consult with the Architect, Contractor, and District regarding matters affecting door and frame openings.

H. Contractor shall include in the base bid the cost of all project requirements for hollow metal doors, frames, anchors, accessories, welding, templating and related components specified herein. In addition to installation, the Contractor will be responsible for receiving and handling of doors and frames, as well as proper protection of product at the job site. Contractor will be required to consult with the District on matters related to doors, frames and hardware, and be responsible for the coordination of delivery, storage, and handling of the material prior to and during installation as noted in Section 1.05.

1.05 DELIVERY, STORAGE AND HANDLING

A. Frames: Before shipment, install temporary spreaders at bottom of bucks and do not remove until frames are installed. Deliver frames cardboard wrapped, crated, palletized or otherwise protected during transit and storage.

B. Doors: Deliver doors cardboard wrapped, crated, palletized or otherwise protected during transit and storage.

C. Inspect hollow metal Work upon delivery for damage. Remove and replace damaged items with new Work as required.

D. Store doors and frames in an upright position at the Project Site under cover from weather related elements. Store units on minimum 4" high wood blocking with ½" air spaces between stacked doors to provide circulation. Do not store doors and frames under plastic or canvas shelters. If shipping packaging becomes wet, immediately remove the packaging.

1.06 SEQUENCING AND SCHEDULING

A. Deliver all doors and frames to the job site in a timely manner so as not to delay the progress of other trades.

B. Issue purchase orders to door, frame and hardware suppliers in sufficient time so as not to interfere with normal quoted delivery of materials.

1.07 WARRANTY

A. Provide an unconditional 2-year material and labor warranty commencing on recordation date of Notice of Completion, per Section 21 of the Construction Services Agreement.

B. A site review with designated District representative is required prior to expiration of warranty as a condition to end warranty period.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following.

1. Curries Company; an ASSA Abloy Group company

2. Steelcraft; an Allegion company

3. The Total Door

2.02 MATERIALS

A. Steel:

1. All doors and frames to be manufactured of commercial quality stretched level flatness, cold rolled steel per ASTM A366 and A568 general requirements or galvanized to A60 minimum coating weight standard per ASTM A924 or A653 hot dip galvanized to A60 minimum coating weight standard. Internal reinforcing shall be hot rolled pickled and oiled steel per ASTM A569.

2. Steel to be sourced from domestic suppliers. Fabrication and assembly to be done within the Continental United States of America.

3. 14 Gauge face skins spot welded to ribs at 6" OC.

B. Sound Deadening Core Insulation:

4. Polystyrene core slab shall be self extinguishing, non-toxic, and permanently bonded to the inside face sheet providing rigidity, insulating and sound deadening properties to the door assembly

2. Steel stiffened core doors to have continuous one-piece vertical steel stiffeners welded to door faces with 1-pound density fiberglass insulation installed between ribs.

C. Supports and Anchors: Fabricate of not less than 14-gauge sheet metal. Galvanize after fabrication. Units to be installed into exterior walls, comply with ASTM A-153, Class B.

D. Fasteners: Provide as shown on Drawings and to suit conditions of secure installations. Furnish 304 Grade stainless steel types at exterior doors.

E. Louvers:

1. Louvers for exterior doors shall be furnished with not less than #12 grille welded to 18 gage steel blades, and removable bronze insert screen on inside. Install louver with tamperproof head through-bolts.

2. Fusible link louvers: Furnished and listed by the State Fire Marshal, UL labeled and installed with tamperproof fasteners.

F. Vision panels in fire labeled doors and exterior doors shall be framed with FGS-75 Fire Glass Stop by Anemostat-West and shall be State Fire Marshal listed. Frame shall be furnished with manufacturer's standard baked-on enamel finish.

G. Shop Paint:

1. Conform to Steel Structures Painting Council (SSPC).

2. Pretreatment/priming coatings shall be compatible with Project site finish painting system per Section 09900.

3. At frames to be grouted, all surfaces that are inaccessible after installation shall be coated with bituminous or asphaltic base paint.

H. Grout: Mix shall be non-chloride. Provide a minimum slump with 6 gallons, maximum of potable water (reduced with height in frame) to each sack of Type I/II Portland cement with fine aggregate, natural and of low porosity.

2.03 SHOP FABRICATION

A. Fabricate steel door and frame units to comply with ANSI A250.8/DSI-100 except where more stringent requirements are specified. Where practical, factory or shop fit and assemble units. Prepare doors to receive door hardware per approved schedule, including internal reinforcing. Do not include unnecessary cutouts in door faces not required by hardware template.

B. General: Welded Unit Construction: Fabricate hollow metal units so as to be rigid, neat in appearance, and free from defects, warp, or buckle.

1. Accurately form metal to required sizes and profiles. Fit and assemble all units in the manufacturer's plant. Weld all joints continuously; grind, dress, and make smooth, flush, and invisible. Metallic filler to conceal manufacturing defects is not permitted.

2. Corner Joints: Furnish corner joints by mitering, or coping and butting, or a combination of both. In both cases, reinforce with steel angle splines. Trim and backbend shall be continuous around corner. Continuously weld joints for full depth and width of frame and trim.

3. Comply with additional fabrication requirements, finishes, and provisions including hardware and alarm systems.

C. Exterior Door and Frame Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

D. Interior Door Faces: Fabricate exposed faces of doors and panels, from the following material:

1. Cold-rolled steel sheet, unless otherwise indicated.

2. Metallic-coated steel sheet for exterior locations and where indicated.

B. Clearances for Fire-Rated Doors: As required by NFPA 80.

F. All doors shall conform to ANSI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance. Door size cycle test to be 4070 to minimum Level A performance for 18 or 16 GA. Doors. Certification of Level A doors shall be submitted with approval drawings by the distributor, including an extended independent lab test of one (1) million cycle test.

2.04 FRAMES

A. General: Provide fully welded steel frames with integral stops and trim for doors, transoms, sidelights, borrowed lights, and other openings complying with ANSI/SDI 100, ANSI A 250.4, Level A, and with details indicated for type and profile. Furnish concealed fastenings, unless otherwise indicated. Exterior frames shall be galvanized to A60 minimum weight standard. All welds ground smooth and re-primed at welded area.

C. Metal Gauge of Frames: Thickness indicated are minimum:

1. Interior hollow metal frames up to 4'-0" wide — 16 gauge sheet steel

2. Interior hollow metal frames wider than 4'-0" — 14 gauge sheet steel

3. All exterior hollow metal frames — 14 gauge sheet steel

4. Borrowed lights up to 4'-0" wide — 16 gauge sheet steel

D. Supports and Anchors: Fabricated from at least 0.042 inch thick, electrolytic zinc-coated or metallic-coated steel sheet. Frame anchors shall comply with fire rated label requirements of the opening.

1. Floor Anchors:

a. 12 gauge minimum, sheet steel or bent steel plate, securely welded inside each jamb, with two holes in anchor at each jamb for 3/8" floor anchorage fasteners.

b. Where required at sloping and uneven floor conditions, or to coordinate adjustments for trim alignments, provide adjustable floor anchors, providing at least 2" height adjustments.

2. Jamb Anchors:

a. Locate anchors near top and bottom and at intermediate points not to exceed 24 inches on center. Provide 2 anchors per head for openings up to 48 inches wide; over 48 inches wide provide anchors at 24 inches on center maximum.

b. Furnish glazed openings in frames with steel glazing stops and moulding of sizes indicated for field installation with countersunk flat head galvanized sheet metal screws. Stops and mouldings shall be 16 gauge material unless otherwise indicated or specified.

c. Anchors in masonry construction: Provide adjustable jamb anchors, "Strap-and-Stirrup" type, and 16 gauge minimum sheet steel. Stirrups shall be corrugated, 2" x 10" minimum size. Steel wire complying with ASTM A510, 3/16 inch in diameter, may be furnished instead of steel sheet.

d. Anchors in Stud Partitions: Provide steel anchors, 16 gauge minimum sheet steel, of design to suit partition construction, securely welded inside each jamb. Anchors inset approximately 1/2."

e. Through Frame Anchors: At frames indicated to be anchored with bolts through the frame, provide countersunk holes for bolts with 16 gauge minimum sheet steel stiffeners full thickness of frame, and securely welded inside each frame at each hole.

E. Inserts, Bolts, and Fasteners: Provide manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153 Class C or D as required.

F. Head Reinforcing: Furnish reinforced heads of frames when wider than 42” with steel angles or channel of 12 gauge minimum, full width of frame and factory welded inside frame. Reinforcing shall not act as lintel or load-carrying member and shall comply with fire rating requirements.

G. Hardware Reinforcement: Reinforce components for hardware installation in accordance with ANSI A115. Provide minimum gauge hardware reinforcing as follows:

1. Hinge reinforcing shall be channel type, 10 gauge minimum, 7 gauge on frames for mortise butt hinges, and 12 gauge on frames with full height continuous hinges.

2. Head assemblies shall be reinforced internally with a full profile, full length, channel-shaped, 12 gage closer reinforcement.

3. Reinforcing for other items of finish hardware shall be 12 gauge minimum.

4. Lock reinforcement shall be 16 gauge channel type typical of Curries G2B (161) and G3 (86) four sided compression resistant design..

H. Mullion and Transom bars: Furnished and fabricated as specified for frames.

I. Glass Lights: At glazed openings, furnish applied stops with mitered corners, of minimum 18 gauge galvanized steel, one-piece lengths, secured within 3” of ends and at 12” centers with flathead countersunk screws, tamper resistant. Corner joints shall be furnished with contact edges closed tight, with trim faces mitered and continuously welded. Frames for multiple openings shall be provided with mullion and/or rail members, fabricated of closed tubular shapes with no visible seams or joints. All joints between faces of abutting members shall be securely welded and finished smooth. Provide condensate weeps 4’-0” on centers, maximum.

J. Finish: Thoroughly clean surfaces and chemically treat for painting. Inaccessible surfaces shall be painted before assembly. Exposed surfaces of doors, frames and accessories shall be filled, sanded smooth and shall receive manufacturer's standard rust-inhibitive primer until complete coverage is achieved. Interior surfaces of frames shall be factory primed.

K. Door Silencers: Except on weather-stripped frames, furnish stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.

2.05 DOORS

A. Doors Construction: Curries 707T, SDI Level 2 – Model 2 – seamless design.

1. Provide type and size of doors with louvers and openings for glazing where indicated.

2. Minimum Door thickness: 1 ¾”.

3. Face Sheet Minimum Gauge: 14 gauge cold rolled sheet steel.

4. Exterior doors shall be galvanized to A60 minimum weight standard.

5. T-edge seamless construction, both hinge and lock edge to be continuously wire welded full height of door and shall be done at the factory.

6. Vertical lock edges beveled 1/8 inch in 2 inches.

7. Door lock edge reinforcing shall be one-piece, full height 14 GA channel. Door hinge edge reinforcing shall be one-piece, full height 12 gauge channel formed and tapped for hinges or as per listed hardware. Both hinge and lock channels to be welded to each face sheet of the door.

8. Top and bottom channels shall be not less than 14 gauge steel welded to face sheets. Close tops of exterior doors flush by the addition of 14 gauge channel fillers, tack welded, seams filled flush and sealed water tight.

9. Astragals where called for to be flat security type or 'Z' as called for in the drawings or specifications.

10. Core Insulation: Sound deadens and insulates entire core of door (full height, width, and thickness of door) with rigid inorganic non-combustible materials. Provide STC ratings where indicated on Drawings, scheduled, or partition rating indicated on Drawings.

    a. Doors, when installed without applied sound seal hardware, shall be provided with the following minimum STC rating: 29

    b. Exterior doors shall be meet or exceed required thermal rating indicated on Drawings, scheduled, or partition rating.

11. Door Louvers:

    a. Provide 18 gauge minimum louver with 50% free air.

    b. Provide all louvers with mesh screens.

    c. Exterior louvers shall be galvanized sheet metal with 20 gauge cut-out reinforcing. Seal water tight.

    d. All louvers shall be furnished with a gray primer.

12. Glass Moulding and Stops:

    a. Furnish fixed mouldings of 18 gauge minimum sheet steel, integral with and welded to security side of door.

    b. Finish: Gray primer.

13. Transom: Fabricate to requirements specified for flush doors.

14. Labeled Doors: Where fire-rated openings and conditions are indicated.

    a. Labeled doors shall be provided with fire-resistance rating indicated and shall be constructed as tested and approved by Underwriters' Laboratories (U.L.) for installation in labeled frame and door assemblies.

b. Gaskets: Provide smoke control gaskets fabricated of silicone rubber for fire-rated doorframes. Gaskets shall be integrally attached to frames during manufacturing. Fastening by self-adhesive strips is not permitted. Gaskets and installation shall conform to requirements of NFPA 105, “Installation of Smoke and Draft Control Door Assemblies.”

c. Fabricate labeled doors with same finished appearance as specified for non-labeled hollow metal doors; with welded door edges, filled and ground smooth; with label affixed to door. Provide heavier gauge materials if required for fire tested door assembly.

d. Where fire labels are required and continuous hinge is specified, install label on top of door within 6” of hinge side of door.

B. Doors Construction: Curries 747T, SDI Level 3 – Model 2 – seamless design.

1. Provide type and size of doors with louvers and openings for glazing where indicated.

2. Steel stiffened rib core. All doors to have continuous, one piece, vertical 20 gauge steel stiffeners. Stiffeners spaced not more than 6 inches apart on vertical supported centerlines. Weld stiffeners to door faces at no more than 6 inches vertically.

3. Minimum Door thickness: 1 ¾”.

4. Face Sheet Minimum Gauge: 14 gauge cold rolled sheet steel, spot welded to ribs at 6” O.C.

5. Exterior doors shall be galvanized to A60 minimum weight standard.

6. T-edge seamless construction, both hinge and lock edge to be continuously wire welded full height of door and shall be done at the factory.

7. Vertical lock edges beveled 1/8 inch in 2 inches.

8. Door lock edge reinforcing shall be one-piece, full height 14 gauge channel. Door hinge edge reinforcing shall be one-piece, full height 12 gauge channel formed and tapped for hinges or as per listed hardware. Both hinge and lock channels to be welded to each face sheet of the door.

9. Top and bottom channels shall be not less than 16 gauge steel welded to face sheets. Close tops of exterior doors flush by the addition of 16 gauge channel fillers, tack welded, seams filled flush and sealed water tight.

10 Astragals where called for to be flat security type or ‘Z’ as called for in the drawings or specifications.

11. Core Insulation: Sound deadens and insulates entire core of door (full height, width, and thickness of door) with rigid inorganic non-combustible materials. Provide STC ratings where indicated on Drawings, scheduled, or partition rating indicated on Drawings.

a. Doors, when installed without applied sound seal hardware, shall be provided with the following minimum STC rating: 29

b. Exterior doors shall be meet or exceed required thermal rating indicated on Drawings, scheduled, or partition rating.

12. Door Louvers:

a. Provide 18 gauge minimum louver with 50% free air.

b. Provide all louvers with mesh screens.

c. Exterior louvers shall be galvanized sheet metal with 20 gauge cut-out reinforcing. Seal water tight.

d. All louvers shall be furnished with a gray primer.

13. Glass Moulding and Stops:

a. Furnish fixed mouldings of 18 gauge minimum sheet steel, integral with and welded to security side of door.

b. Finish: Gray primer.

2.06 FABRICATION PROVISIONS FOR HARDWARE

A. Hardware Reinforcement: Provide reinforcement for finish hardware items. Mortise, drill and tap to template requirements for mortise type hardware. Reinforcement shall be sheet steel or plate.

1. Butt reinforcing shall be 7 gauge minimum of length 4” longer than length of butt.

2. Door closer reinforcement shall be from the top of door down, 10” high, full width of door, 10 gauge sheet steel as indicated in the detail section of this Specification.

3. Kickplate reinforcement shall be located from the bottom of the door, 12” high, full width of door, 10 gauge sheet steel as indicated in the detail section of this Specification.

4. Gauge and size or reinforcement for hardware items not listed shall be as required by Reference Standards, 12 gauge minimum, or the templates of those items, whichever is heavier.

B. Silencers: Except for exterior doors, drill and punch frames for three (3) silencers at lock jamb of single swing doors or in double doors with astragal and one (1) silencer per leaf in heads of doubled door frames. Install plastic plugs to keep holes clear during construction.

C. Plaster Guards: Provide 26 gauge galvanized steel plaster guards or dust cover boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

D. Other Hardware Requirements: Cut, reinforce, drill, and tap doors and frames for other hardware including energy management switches or contacts and security devices in accordance with furnished hardware templates for accessory items.

1. Provide minimum 12 gauge reinforcing or manufacturer's recommendation, whichever is greater.

2. Provide minimum 26 gauge cover boxes behind all hardware cutouts.

3. Fire rated doors shall accommodate mortised or other specified hardware.

4. Install lock strikes with required clearances for silencers and weather/sound stripping.

E. Trimco #1111C Flush Pull to be installed at 34 inches centerline from the floor, and 3.25 inches from outside door edge. Review with District.

2.07 SHOP PRIMING

A. All exposed and concealed carbon steel metal surfaces of all hollow metal doors, frames and other hollow metal Work of this Section, not otherwise finished (galvanized) shall factory baked-on enamel primer finish. Coordinate compatible touch-up primer with field painting and finish coats.

B. All exposed metal Work shall be bonderized before shop priming.

C. All concealed surfaces shall be shop primed before assembly. All exposed surfaces shall be shop primed after assembly

E. Hollow metal Work shall be shop prime painted by being completely immersed or coated. Items of hollow metal fabrication may be oven baked for fast dry conditions.

PART 3 - EXECUTION

3.01 FRAME INSTALLATION

A. Install steel frames accurately in location, perfect alignment, plumb, straight and true. Brace frames to prevent displacement. Install units in accordance with manufacturer's instructions and approved shop drawings.

B. Anchor frames in concrete and concrete unit masonry with galvanized anchor bolts; 3/8 inch diameter, counter-sunk at 24 inches on center at head and jamb. Install a minimum of two (2) head anchors and three (3) or more in doors exceeding 42". Provide three (3) jamb anchors for standard height doors and additional anchors per 24" for doors over seven feet.

C. Anchor frames in steel and wood frame partitions with a minimum of two (2) head anchors and three (3) or more in doors exceeding 42". Provide three (3) jamb anchors for standard height doors and additional anchors per 24" for doors over seven feet.

D. Provide adjustable floor clips for frames.

E. Install frame at fire rated openings in accordance with NFPA Standard No. 80.

F. Furnish filler for anchor attachment screws, and sand smooth.

3.02 DOOR INSTALLATION

A. Install steel doors in accordance with manufacturer's instructions and as indicated on Drawings and finish hardware specifications. Coordinate with the Work of other trades.

B. Doors are to be expertly hung and shall fit snug against all stops. Doors shall fit accurately and hang free from hinge bind with a uniform clearance of 1/8 inch at head and jambs. Adjust operable parts for correct function.

C. Remove hardware, except primer-coated items, tag, box and install after finish painting has been completed.

D. Maximum clearances at edge of doors.

1. Between door head and jambs: 1/8 inch

2. At meeting edges of pairs of doors and at mullions: 1/8 inch

3. At transom panels without transom bars: 1/8 inch

4. At sills without thresholds: 5/8 inch maximum above finish floor. Door clearance requirement shall be reviewed with District before issuing purchase order.

5. At sills with threshold: 1/8 inch above threshold.

3.04 PRIME COAT TOUCH-UP

A. Immediately after installation, remove rust, repair damaged surfaces to new condition, sand smooth, and install touch-up primer.

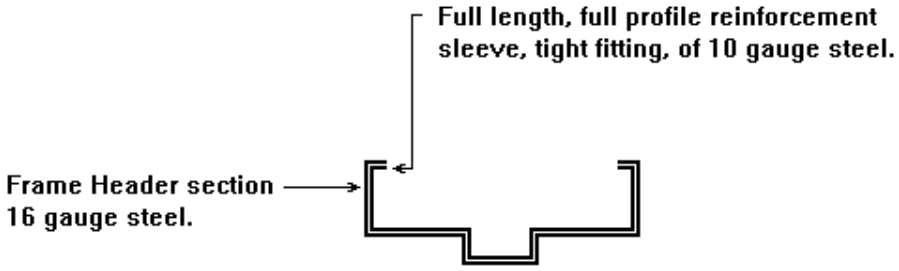
3.05 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.06 PROTECTION

A. Protect the Work of this section until Final Completion.

Detail # 2 - Frame Header Reinforcement
Door Closer reinforcement for all steel door frames.



END OF SECTION

SECTION 08 3116

ACCESS PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fire rated and non-rated access doors and frames.

1.02 RELATED SECTIONS

A. Section 09 2900 - Gypsum Board.

B. Section 09 3013 - Ceramic Tiling.

1.03 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's product specifications and installation instruction.

B. Shop Drawings: Submit shop drawings including sizes, types, finishes, scheduled locations and details of adjoining work.

C. Submission of all material proposed for use shall be per section 38 of the Construction Services Agreement.

1.04 QUALITY ASSURANCE

A. Manufacturer of fire rated access doors and frames to conform to requirements of Underwriters Laboratories or other acceptable inspection and certification agency.

B. Provide labels indicating rating.

PART 2 - PRODUCTS

2.01 MANUFACTURES

A. Provide products manufactured by:

1. Karp Associates, Inc.
2. Babcock-Davis; A Cierra Products Co.
3. Dur-Red Products.
4. ElmdorlStoneman; Div. of Acorn Engineering Co.
5. J.L. Industries
6. Milcor Inc.
7. Bilco Company

2.02 MATERIALS

A. Ceilings:

1. Non-rated: Provide Karp DSC-214M or equal with 14 gage steel frame, 16 gage steel door. Flange shall be one-piece construction 1" wide. Door and trim shall have radius corners. Hinge shall be pin type, spring loaded making door removable. Locks shall be key operated cylinder lock with automatic dust. Finish shall be prime coat of rust inhibitive electrostatic powder, baked white enamel. At wet locations provide stainless steel with No. 4 satin polish finish.

2. Fire-rated: Provide Karp KRP-150FR or equal with 16 gage steel frame, 20 gage door panel, 2” thick fire rated insulation, continuous piano type hinge, key operated lock, prime coat of rust-inhibiting paint. At wet locations provide stainless steel with No. 4 satin polish finish.

B. Walls:

1. Non-rated: Provide Karp DSC-214M or equal with 14 gage steel frame, 16 gage steel door. Flange shall be one-piece construction 1” wide. Door and trim shall have radius corners. Hinge shall be pin type, spring loaded making door removable. Locks shall be key operated cylinder lock with automatic dust shutter. Finish shall be prime coat of rust inhibitive electrostatic powder, baked white enamel. At wet locations provide stainless steel with No. 4 satin polish finish.

2. Fire-rated: Provide Karp KRP-150FR or equal with 16 gage steel frame, 20 gage door panel, 2” thick fire rated insulation, continuous piano type hinge, key operated lock, prime coat of rust-inhibiting paint, size as indicated on Drawings. At wet locations provide stainless steel with No. 4 satin polish finish.

3. Tile Applied: Provide RUTK Series by Nystrom or equal with 16 gage steel frame, 14 gage door panel, continuous cabinet type hinge, key operated lock, size as indicated on Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify rough openings for door and frame are correctly sized and located. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. General: Install access doors in accordance with manufacturer's printed instructions and as indicated on the Drawings.

B. Install units plumb and level in access openings. Position to provide convenient access to concealed work requiring access. Verify final location, height and swing with Architect.

C. Secure rigidly in place and install flush to adjacent surfaces.

D. Install fire rated doors in strict accordance with UL requirements.

E. Submit keys to District.

3.03 ADJUSTING

A. Adjust latch to operate smoothly.

B. Repair or replace damaged doors and doors, which do not operate smoothly.

END OF SECTION

SECTION 08 33 36

OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Overhead coiling insulated doors.

1.2 RELATED SECTIONS

A. Section 05 5000 - Metal Fabrications: Support framing and framed opening.

B. Section 08 7100 - Door Hardware: Product Requirements for cylinder core and keys.

C. Section 09 9000 - Painting: Field applied finish.

D. Section 26 0533 - Raceway and Boxes: Conduit from electric circuit to door operator and from door operator to control station.

E. Section 26 2726 - Wiring Connections: Power to disconnect.

1.3 REFERENCES

A. ANSI/DASMA 108 - American National Standards Institute Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference.

B. NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.

C. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

D. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

E. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

F. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

G. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

H. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

J. NEMA MG 1 - Motors and Generators.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Overhead coiling insulated doors:
   1. Wind Loads: Design door assembly to withstand wind/suction load of 20 psf (958 Pa) without damage to door or assembly components in conformance with ASTM E 330.
   2. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.

B. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 3300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Details of construction and fabrication.
   4. Installation instructions.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

G. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

B. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 COORDINATION

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

A. Warranty: Manufacturer’s limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years or 20,000 cycles, whichever occurs first.

B. Warranty: Manufacturer’s limited door system warranty for 2 years for all parts and components.

C. PowderGuard Finish
   1. PowderGuard Max: Applied to curtain, guides, bottom bar, headplates: Manufacturer’s limited Max Finish warranty for 5 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com.

B. Substitutions: Or Equal

C. Requests for substitutions will be considered in accordance with provisions of Section 01 2513.

2.2 INSULATED OVERHEAD COILING SERVICE DOORS

A. Overhead Coiling Stormtite Insulated Service Doors: Overhead Door Corporation Model 625.
   1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
      a. Flat profile type F-265i for doors up to 40 feet (12.19 m) wide.
      b. Front slat fabricated of:
         1) 18 gauge galvanized steel.
      c. Back slat fabricated of:
         1) 22 gauge galvanized steel.
      d. Slat cavity filled with CFC-free foamed-in-place, polyurethane insulation.
         1) R-Value: 7.7, U-Value: 0.13.
         2) Sound Rating: STC-21.
   2. Performance:
      a. Through Curtain Sound Rating: Sound Rating: STC-28 (STC-30+ with HZ noise generator) as per ASTM E 90.
      b. Installed System Sound Rating: STC-21 as per ASTM E 90.
      c. U-factor: 0.91 NFRC test report, maximum U-factor of no higher than 1.00.
      d. Air Infiltration: Meets ASHRAE 90.1 & IECC 2012/2015 C402.4.3 Air leakage <1.00 cfm/ft2.
   3. Slats and Hood Finish:
      a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.
         1) Polyester Top Coat.
            (a) Gray polyester.
         2) Powder Coat:
            (a) PowderGuard Max powder coat, color as selected by Architect. Black at Interior. Silver exterior.
         3) Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.
   4. Weatherseals:
      a. Vinyl bottom seal, exterior guide and internal hood seals.
      b. Interior guide weatherseal.
      c. Lintel weatherseal.
      d. Air Infiltration Package, IECC 2012/2015 listed; product to meet C402.4.3 2012 Air leakage <1.00 cfm/ft2.
         1) Air infiltration perimeter seal package includes: guide cover, guide cap, dual brush exterior guide seal, 4 inch finned lintel brush seal and vinyl bottom seal.
   5. Bottom Bar:

a. Two galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.

6. Guides: Three structural steel angles.
7. Brackets:
   a. Galvanized steel to support counterbalance, curtain and hood.
8. Finish; Bottom Bar, Guides, Headplate and Brackets:
   a. Finish: PowderGuard Max powder color as selected by the Architect.
9. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
10. Hood: Provide with internal hood baffle weatherseal.
    a. 24 gauge galvanized steel with intermediate supports as required.
11. Manual Operation:
    a. Crank operation.
12. Windload Design:
    a. Standard windload shall be 20 PSF.
13. Locking:
    a. Chain keeper locks for chain hoist operation.
14. Wall Mounting Condition:
    a. Face-of-wall mounting.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.

F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

G. Install perimeter trim and closures.

H. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION

SECTION 08 4413

GLAZED ALUMINUM CURTAIN WALL
(DEFERRED APPROVAL)

PART 1 – GENERAL

1.01 SUMMARY

A. Basis of Design and Permit Approval:
   1. Glazed Aluminum Curtain Wall
      a. Arcadia, Inc., T500 Series (OPG-1900), 2-1/4" x 7" Captured, for 1" glass.

B. Other acceptable Manufacturers (Substitutions):
   1. Substitutions may or may not be accepted after Architect and owner complete evaluation for content and schedule impact.
   2. Substitutions shall include all costs for redesign and consequential changes by other trades along with the architect and related approvals by governing agencies.
   3. Revisions to shop drawings illustrating the proposed changes will not be considered adequate for DSA review and approval.
   4. A minimum fee of $10,000 for DSA review and processing by the architect to be included for DSA review of any substituted system other than basis of design.
   5. Substitutions maybe acceptable based on the Architects review and approval for submittal to DSA. If substituted manufacturer cannot reproduce DSA design and approval in a timely manner, they shall be subject to a time and material back charge for any delays.

C. Related Section:
   1. Storefront framing and Entrance doors.

1.02 REFERENCES

A. American Architectural Manufacturers Association (AAMA)

1.03 SYSTEM DESCRIPTION CURTAIN WALL

A. General: In addition to requirements shown or specified, comply with:
   1. Applicable provisions of AAMA Metal Curtain Wall Manual for design, materials, fabrication and installation of component parts.

B. Design Requirements: Arcadia T500 Series is a self-supporting curtain wall, with pressure plate and covers attached to the tongue of back member.

C. Performance Requirements:

1. Limit air leakage through assembly to 0.06 CFM/min/sq. ft. (.00003 m^3/sm^2) of wall area at 6.24 PSF (300 Pa) as measured in accordance with ASTM E283.

2. Water Resistance: No water leakage when measured in accordance with ASTM E331 with a static test pressure of 15PSF.

3. Dynamic Water Resistance: No water leakage, when measured in accordance with AAMA 501.1-94 with a dynamic test pressure of 15PSF.

4. Uniform Load Deflection under ( ) psf positive and ( ) psf negative design wind pressure normal to the plane of the wall, shall not exceed L/240 + .250 inches for spans over 13'-6", when tested in accordance with ASTM E 330.

5. Uniform Load Structural at a pressure 1.5 times the design wind pressure in accordance with ASTM E 330.

6. System shall not deflect more than 1/8" at the center point, or 1/16" at the center point of a horizontal member, once deadload points have been established.

7. Seismic testing shall conform to AAMA recommended static test method for evaluating performance of curtain walls and storefront wall systems due to horizontal displacements associated with seismic movements and building sway.

1.04 QUALITY ASSURANCE

A. Single Source Responsibility:

1. Obtain entrances, storefronts and finish through one source from a single manufacturer.

B. Provide test reports from AAMA accredited laboratories certifying the performances as specified in 1.03.

1. Provide test reports from AAMA accredited laboratories.

2. Test reports shall be accompanied by the curtain wall manufacturer's letter of certification stating that the tested curtain wall meets or exceeds the referenced criteria for the appropriate curtain wall type.

3. Confirm to requirements of CBC 2406.2, tables 2406.2 (1) and 2406.2 (2), UBC Standards – Safety Glazing (see attachment at end of this section).

4. Manufacturer and Glazed Curtain Wall contractor shall demonstrate a minimum of ten years of experience in the successful completion of projects utilizing similar systems, applications and performance requirements.

5. Manufacturer and Glazed Curtain Wall contractor shall provide a list of five similar completed projects with addresses of the location, Architect and District

.

Mockup:

a. Before beginning work, erect a mockup at a location on the site acceptable to the Architect to demonstrate proposed Glazed Curtain Wall System and associated framing, waterproofing, flashing, sealants, and fasteners necessary to form the Glazed Curtain Wall System as shown on the drawings including construction, installation methods, coordination of the work specified in other relevant sections, accessories, features, color and texture.

b. The Architect will select mockup size and features, but in no case shall it be less than 7 feet long by 7 feet high.

   a. Use same personnel, materials and construction techniques intended to be used for the Project.

c. Architect will review the mockup to determine if the Work falls within acceptable ranges for color and texture variation, unevenness, appearance and workmanship. Final acceptance of colors and material will be made from mockup samples.

d. Make corrections requested by the Architect, or remove and replace mockup when corrective work is not acceptable. Repeat mockup(s) until Architect's approval is obtained.

e. Protect approved mockup, which will be used as a standard for all remaining work on the Project, until its removal is authorized. Remove mockup only after completion and final acceptance of Glazed Curtain Wall System work.

C. Pre-installation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section “Quality Requirements”. Review methods and procedures related to Glazed Curtain Wall System including, but not limited to, the following:

1. Meet with District, Architect, District's insurer if applicable, testing and inspecting agency representative, Glazed Curtain Wall Installer, Glazed Curtain Wall System manufacturer’s representative, and installers whose work interfaces with or affects Glazed Curtain Wall System including installers of doors and window systems.

2. Review methods and procedures related to Glazed Curtain Wall System installation, including manufacturer's written instructions.

3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.05 REFERENCES

A. Pass-through windows for ticket booths and cashiers shall conform to the reach and access requirements of CBC Section 11B-305, 11b-206.7.1, and 11B-202 for accessible transaction areas. Accessible pass-through shelf shall not exceed 34” above finished floor surface.

1.06 SUBMITTALS

A. Submit shop drawings to the architect for his approval. Drawings shall show scale elevations and sections. Full size sections shall be shown only when needed for clarity. Drawings shall show construction of all parts of the work, including metal and glass thickness, methods of joining, details of all field connections and anchorage, fastening and sealing methods, metal finishes, and all pertinent information. Relationship to other work should be clearly indicated. No work shall be fabricated until shop drawings for that work have been finally approved for fabrication.

B. Submit finish samples and test reports.

C. Submission of all materials proposed for use shall be per Section 38 of the Construction Services Agreement.

1.07 WARRANTY

System shall be warranted against failure and/or deterioration of metals due to manufacturing process for a period of two (2) years.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

1. Arcadia, Inc., 2301 E Vernon, Vernon, CA. Telephone 323/269-7300, Fax 323/269-7390.

B. Acceptable Products:

1. Arcadia, Inc., T500 Series (OPG-1900).

2.02 FRAMING MATERIALS AND ACCESSORIES

A. Framing members, transition members, mullions, adaptors, and mounting: Extruded 6063-T6 aluminum alloy (ASTM B221 – Alloy G.S. 10a T6).

B. Screws, fastening devices, and internal components: Aluminum, stainless steel, or zinc-plated steel in accordance with ASTM.A-164. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from aluminum.

C. Glazing Gasket

1. Compression-type design, replaceable, molded or extruded santoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).

2.03 FINISH

A. Finish all exposed areas of aluminum and components as indicated.

1. An Architectural Class II or I anodic coating conforming with AA-M12C22A31/AA-M12C22A41.
    a. Anodize finish color shall be Colornodic #11 Clear.

2.04 SYSTEM FABRICATION

A. Provisions shall be made at all sealed horizontals to keep moisture accumulation to the exterior.

B. System shall provide for two-piece horizontal framing so that all fasteners at intersection of horizontal and vertical members will be concealed.

C. There shall be no exposed fasteners at perimeter sections.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine conditions and verify substrate conditions are acceptable for product installation.

3.02 INSTALLATION

A. Install in accordance with approved shop drawings and manufacturers installation instructions.

3.03 FIELD QUALITY CONTROL

A. Test the curtain wall for water leaks in accordance with AAMA 501.2. Conduct test in the presence of the Architect. Correct deficiencies observed as a result of this test.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Sections includes:

1. Mechanical and electrified door hardware for:

a. Swinging doors.

B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 07 Section “Joint Sealants” for sealant requirements applicable to threshold installation specified in this section.
2. Division 26 sections for connections to electrical power system and for low-voltage wiring.

1.3 REFERENCES

A. UL - Underwriters Laboratories

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. ANSI - American National Standards Institute

1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

C. California Code of Regulations

1. Title 24: California Building Standards Code

1.4 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 requirements.
2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.

B. Action Submittals:

1. Product Data: Product data including manufacturers’ technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:

    a. Wiring Diagrams: For power, signal, and control wiring and including:
        1) Details of interface of electrified door hardware and building safety and security systems.
        2) Schematic diagram of systems that interface with electrified door hardware.
        3) Point-to-point wiring.
        4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.

    a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:

    a. Door Index; include door number, heading number, and Architects hardware set number.
    b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
    c. Type, style, function, size, and finish of each hardware item.
    d. Name and manufacturer of each item.
    e. Fastenings and other pertinent information.
    f. Location of each hardware set cross-referenced to indications on Drawings.
    g. Explanation of all abbreviations, symbols, and codes contained in schedule.
    h. Mounting locations for hardware.
    i. Door and frame sizes and materials.
    j. Name and phone number for local manufacturer's representative for each product.

k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include how door will operate on egress, ingress, and fire and smoke alarm connection.
   1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.

5. Key Schedule:

   a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
   b. Use ANSI/BHMA A156.28 “Recommended Practices for Keying Systems” as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
      1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.

   f. Prepare key schedule by or under supervision of supplier, detailing Owner’s final keying instructions for locks.

6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.

C. Informational Submittals:

1. Qualification Data: For Supplier and Installer.
2. Product Certificates for electrified door hardware, signed by manufacturer:

   a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.

3. Certificates of Compliance:

   a. Certificates of compliance for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
   b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in “QUALITY ASSURANCE” article, herein.
   c. Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in “QUALITY ASSURANCE” article, herein.

4. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by qualified testing agency, for door hardware on doors located in accessible routes.

5. Warranty: Special warranty specified in this Section.

D. Closeout Submittals:

1. Operations and Maintenance Data : Provide in accordance with Division 01 and include:

a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
b. Catalog pages for each product.
c. Name, address, and phone number of local representatives for each manufacturer.
d. Parts list for each product.
e. Final approved hardware schedule, edited to reflect conditions as-installed.
f. Final keying schedule
g. Copies of floor plans with keying nomenclature
h. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.5 QUALITY ASSURANCE

A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.

1. Where specific manufacturer’s product is named and accompanied by “No Substitute,” including make or model number or other designation, provide product specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)

a. Where no additional products or manufacturers are listed in product category, requirements for “No Substitute” govern product selection.

2. Where products indicate “acceptable manufacturers” or “acceptable manufacturers and products”, provide product from specified manufacturers, subject to compliance with specified requirements and “Single Source Responsibility” requirements stated herein.

B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
4. Coordination Responsibility: Coordinate installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.

a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.

C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.

D. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
2. Manufacturers that perform electrical modifications and that are listed by testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

E. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

F. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

G. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

H. Means of Egress Doors: Latches do not require more than 5 lbf (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.

I. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in “REFERENCES” article, herein.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbf (22.2 N).
2. Maximum opening-force requirements:

    a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
    b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
    c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high. A change in level of 1/2 inch (13 mm) is permitted to be 1/4 inch vertical plus 1/4 inch beveled. However, in no case may the combined change in level exceed 1/2 inch.
4. Adjust door closer sweep periods so that, from open position of 70 degrees, door will take at least 3 seconds to move to 3 inches (75 mm) from latch, measured to leading edge of door.

J. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01.

1. Attendees: Owner, Contractor, Architect, Installer, Owner’s Security Consultant, and Supplier.
2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:

a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
b. Preliminary key system schematic diagram.
c. Requirements for key control system.
d. Requirements for access control.
e. Address for delivery of keys.

K. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Inspect and discuss electrical roughing-in for electrified door hardware.
4. Review sequence of operation for each type of electrified door hardware.
5. Review required testing, inspecting, and certifying procedures.

L. Coordination Conferences:

1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.

a. Attendees: Door hardware supplier, door hardware installer, Contractor.
b. After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.

2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

a. Attendees: electrified door hardware supplier, doors and frames supplier, electrified door hardware installer, electrical subcontractor, Owner, Owner’s security consultant, Architect and Contractor.
b. After meeting, provide letter of compliance to Architect, indicating when coordination conference was held and who was in attendance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

1. Deliver each article of hardware in manufacturer’s original packaging.

C. Project Conditions:

1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

D. Protection and Damage:

1. Promptly replace products damaged during shipping.
2. Handle hardware in a manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

F. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.7 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Direct shipments not permitted, unless approved by Contractor.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Years from date of Substantial Completion, for durations indicated.

a. Closers:
1) Mechanical: 10 years

b. Exit Devices:
1) Mechanical: 3 years.
2) Electrified: 1 year.

c. Locksets:
1) Mechanical: 3 years

d. Continuous Hinges: 10 years.
e. Key Blanks: Lifetime

2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.1 REGULATORY REQUIREMENTS:

A. Locate latching hardware between 34 inches to 44 inches above the finished floor, per 2019 California Building Code, Section 11B-404.2.7.

1. Panic hardware: locate between 36 inches to 44 inches above the finished floor.

B. Handles, pull, latches, locks, other operable parts:

1. Readily openable from egress side with one hand and without tight grasping, tight pinching, or twisting of the wrist to operate. 2019 California Building Code Section 11B-309.4.
2. Force required to activate the operable parts: 5.0 pounds maximum, per 2019 California Building Code Section 11B-309.4.

C. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2019 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.

1. Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.

D. Adjust door closer sweep periods so that from an open position of 90 degrees, the door will take at least 5 seconds to move to a point 12 degrees from the latch, measured to the landing side of the door, per 2019 California Building Code Section 11B-404.2.8.

E. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per 2019 California Building Code Section 11B-404.2.10.

1. Applied kickplates and armor plates: bevel the left and right edges; free of sharp or abrasive edges.
2. Tempered glass doors without stiles: bottom rail may be less than 10 inches if top leading edge is tapered 60 degrees minimum.

F. Door opening clear width no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and below 80 inches, and the hardware projects no more than 4 inches. 2019 California Building Code Section 11B-404.2.3.

3. Door closers and overhead stops: not less than 78 inches above the finished floor or ground, per 2019 California Building Code 11B-307.4.

G. Thresholds: floor or landing no more than 0.50 inches below the top of the threshold of the doorway, per 2019 California Building Code Section 11B-404.2.5. Vertical rise no more than 0.25 inches, change in level between 0.25 inches and 0.50 inches: beveled to slope no greater than 1:2 (50 percent slope). 2019 California Building Code Section 11B-303.2 & ~.3.

H. Floor stops: Do not locate in path of travel. Locate no more than 4 inches from walls, per DSA Policy #99-08 (Access).

I. Pairs of doors with independently-activated hardware both leafs: limit swing of right-hand or right-hand-reverse leaf to 90 degrees to protect persons reading wall-mounted tactile signage, per 2019 California Building Code Section 11B-703.4.2.

J. Door and door hardware encroachment**:** when door is swung fully-open into means-of-egress path, the doo may not encroach/project more than 7 inches into the required exit width, with the exception of door release hardware such as lockset levers or panic hardware. These hardware items must be located no less than 34-inches and no more than 44-inches above the floor/ground. 2019 California Building Code, Section 1005.7.1.

K. In I-2 occupancies, latch release hardware is not permitted to project in the required exit width, regardless of its mounting height, per 2019 California Building Code, Section 1005.7.1 at Exception 1.

1.9 MAINTENANCE

A. Maintenance Tools:

1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
2.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Where “No Substitute” is noted, submittals and substitution requests for other products will not be considered.

B. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturer” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

E. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.

3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
4. Install hardware with fasteners provided by hardware manufacturer.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors: Hardwired Electronic Access Control Lockset and Exit Device Trim:

1. Data: 24AWG, 4 conductor shielded, Belden 9843, 9841 or comparable.
2. DC Power: 18 AWG, 2 conductor, Belden 8760 or comparable.
3. Provide type of data and DC power cabling required by access control device manufacturer for this installation.
4. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with sufficient number and wire gauge with standardized Molex plug connectors to accommodate electric function of specified hardware. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.3 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series
2. Acceptable Manufacturers and Products: Hager BB series, McKinney TA/T4A series, Stanley FBB Series

B. Requirements:

1. Provide five-knuckle ball bearing hinges conforming to ANSI/BHMA A156.1.
2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:

a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:

a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
b. Interior: Heavy weight, steel, 5 inches (127 mm) high

4. 2 inches or thicker doors:

a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.

6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

    a. Steel Hinges: Steel pins
    b. Non-Ferrous Hinges: Stainless steel pins
    c. Out-Swinging Exterior Doors: Non-removable pins
    d. Out-Swinging Interior Lockable Doors: Non-removable pins
    e. Interior Non-lockable Doors: Non-rising pins

8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
9. Doors 36 inches (914 mm) wide or less furnish hinges 4-1/2 inches (114 mm) high; doors greater than 36 inches (914 mm) wide furnish hinges 5 inches (127 mm) high, heavy weight or standard weight as specified.
10. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
11. Provide mortar guard for each electrified hinge specified.
12. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.4 CONTINUOUS HINGES

A. Aluminum Geared

1. Manufacturers:

    a. Scheduled Manufacturer: Ives.
    b. Acceptable Manufacturers: Markar, Stanley.

2. Requirements:

    a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
    b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum, with 0.25-inch (6 mm) diameter Teflon coated stainless steel hinge pin.
    c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
    d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
    e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
    f. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware.
    g. Install hinges with fasteners supplied by manufacturer.
    h. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.5 ELECTRIC POWER TRANSFER

A. Manufacturers:

   a. Scheduled Manufacturer: Von Duprin EPT-10
   b. Acceptable Manufacturers: ABH PT1000, Securitron CEPT-10

B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.

C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.6 FLUSH BOLTS

A. Manufacturers:

   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Rockwood, Trimco

B. Requirements:

   1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.7 COORDINATORS

A. Manufacturers:

   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Rockwood, Trimco

B. Requirements:

   1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
   2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

2.8 MORTISE LOCKS

A. Manufacturers and Products:

   1. Scheduled Manufacturer and Product: Schlage L9000 series
   2. Acceptable Manufacturers and Products: No substitutions.

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1 Operational, Grade 1 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to “KEYING” article, herein.
2. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
3. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
4. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.

    a. Lever Design: Schlage 06A.
    b. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

C. Padlocks:

1. Manufacturers and Products:

    a. Scheduled Manufacturer and Product: Schlage KS series
    b. Scheduled Manufacturer and Product:: No substitutions.

2. Requirements:

    a. Provide padlocks with 1 inch (25 mm) shackle height, unless noted otherwise, as specified. Cylinders: Refer to “KEYING” article, herein.

2.9 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 98 series
2. Acceptable Manufacturers and Products: No substitutions.

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to “KEYING” article, herein.
2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
3. Touchpad: Extend minimum of one half of door width. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. No plastic inserts are allowed in touchpads.
4. Provide exit devices with dead-latching feature for security and for future addition of alarm kits and/or other electrified requirements.
5. Provide flush end caps for exit devices.
6. Provide exit devices with manufacturer’s approved strikes.
7. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.

8. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
9. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
10. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.

    a. Lever Style: Match lever style of locksets.
    b. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

11. Provide UL labeled fire exit hardware for fire rated openings.
12. Provide electrified options as scheduled.
13. Accessibility: Require not more than 5lb. To retract the latch bolt per CBC 11B-404..2.7 and 11B-309.4.

    a. Mechanical method: Von Duprin “AX-“ feature, where touchpad directly retracts the latch bolt with 5 lb or less of force. Provide testing lab certification confirming that the mechanical device is independent third-party tested to meet this 5 lb requirement.

2.10 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage or Von Duprin PS900 series
2. Acceptable Manufacturers and Products: Precision ELR series, Sargent 3500 series, Dynalock 5000 series, Securitron BPS series, Security Door Controls 600 series

B. Requirements:

1. Provide power supplies, recommended and approved by manufacturer of electrified locking component, for operation of electrified locks, electrified exit devices, magnetic locks, electric strikes, and other components requiring power supply.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply , and UL class 2 listed.
4. Options:

    a. Provide power supply, where specified, with internal capability of charging sealed backup batteries 24 VDC, in addition to operating DC load.
    b. Provide sealed batteries for battery back-up at each power supply where specified.
    c. Provide keyed power supply cabinet.

5. Provide power supply in an enclosure, complete, and requiring 120VAC to fused input.
6. Provide power supply with emergency release terminals, where specified, that allow release of all devices upon activation of fire alarm system complete with fire alarm input for initiating “no delay” exiting mode.

2.11 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer: Schlage
2. Acceptable Manufacturers: No substitutions.

B. Requirements:

1. Provide small format interchangeable core (SFIC) cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Replaceable Construction Cores.

    a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
        1) 3 construction control keys
        2) 12 construction change (day) keys.

    b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.12 KEYING

A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Provide cylinders/cores keyed into Owner's existing factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

1. Key system: Schlage Everest 29 R

C. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.

    a. Master Keying system as directed by the Owner.

2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:

    a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
    b. Patent Protection: Keys and blanks protected by one or more utility patent(s) until the year 2029.

4. Identification:

    a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Blind code marks shall not include actual key cuts.

b. Identification stamping provisions must be approved by the Architect and Owner.
c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
d. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.
e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

5. Quantity: Furnish in the following quantities.

a. Change (Day) Keys: 3 per cylinder/core.
b. Permanent Control Keys: 3.
c. Master Keys: 6.

2.13 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4040XP series.
2. Acceptable Manufacturers and Products: No Substitutions..

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 3/4 inch (19 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.14 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives

2. Acceptable Manufacturers: Rockwood, Trimco

B. Requirements:

1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.15 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Rockwood, Trimco

B. Requirements:

1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes of plates:

a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.16 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Rockwood, Trimco

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.

2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide a closer with integral stop.

2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International
2. Acceptable Manufacturers: National Guard, Pemko

B. Requirements:

1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
2. Size of thresholds:

    a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
    b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width. Thresholds shall comply 08 7100 section 1.5 I.3 above.

3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.18 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Rockwood, Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.19 LATCH PROTECTORS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Rockwood, Trimco

B. Provide stainless steel latch protectors of type required to function with specified lock.

2.20 COAT HOOKS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Rockwood, Trimco

B. Provide coat hooks as specified.

2.21 FINISHES

A. Finish: BHMA 626/652 (US26D); except:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Continuous Hinges: BHMA 630 (US32D)
3. Continuous Hinges: BHMA 628 (US28)
4. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
5. Protection Plates: BHMA 630 (US32D)
6. Overhead Stops and Holders: BHMA 630 (US32D)
7. Door Closers: Powder Coat to Match
8. Wall Stops: BHMA 630 (US32D)
9. Latch Protectors: BHMA 630 (US32D)
10. Weatherstripping: Clear Anodized Aluminum
11. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Where on-site modification of doors and frames is required:

1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
2. Field modify and prepare existing door and frame for new hardware being installed.
3. When modifications are exposed to view, use concealed fasteners, when possible.
4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:

a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

H. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as indicated in keying section.

I. Wiring: Coordinate with Division 26, ELECTRICAL sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Testing and labeling wires with Architect's opening number.

J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.

K. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

L. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

1. Coordination: Coordinate provision with the security systems provider to mitigate excessive or redundant purchase.
2. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.

M. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

N. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

O. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

P. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

Q. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

B. Hardware Sets:

HW SET: 01

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-EO	626	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-NL-OP-110MD	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	SFIC MORTISE CYL.	80-132 X K510-730 (MULLION)	626	SCH
2	EA	SFIC MORTISE CYL.	80-132 XQ11-948 (DOGGING)	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
4	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH TORX	689	LCN
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
1	EA	DOOR SEAL/SWEEP	PROVIDED BY DOOR MANUFACTURER		B/O
1	EA	THRESHOLD	103A-223 (OR PER SILL DETAIL)	A	ZER

HW SET: 02

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1HW SH 4.5 X 4.5 NRP	630	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-EO	626	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-NL-OP-110MD	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	SFIC MORTISE CYL.	80-132 X K510-730 (MULLION)	626	SCH
2	EA	SFIC MORTISE CYL.	80-132 XQ11-948 (DOGGING)	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
4	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	4040XP EDA TORX	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	SET	GASKETING	328AA-S	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	103A-223 (OR PER SILL DETAIL)	A	ZER

HW SET: 03

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-NL-OP-110MD	626	VON
1	EA	SFIC MORTISE CYL.	80-132 XQ11-948 (DOGGING)	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA (IF EXPOSED ABOVE)	AA	ZER
1	EA	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	103A-223 (OR PER SILL DETAIL)	A	ZER

INSTALL SEAL BEFORE CLOSER & STRIKE.

HW SET: 04

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080HD 06A	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	RAIN DRIP	142AA (IF EXPOSED ABOVE)	AA	ZER
1	EA	THRESHOLD	103A-223 (OR PER SILL DETAIL)	A	ZER
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 05

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1 SH 4.5 X 4.5 NRP	630	IVE
1	EA	CONST LATCHING BOLT	FB51P (24" @ TOP)	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080HD 06A	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4040XP EDA TORX	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	GASKETING	429AA-S	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	ASTRAGAL	43SP	SP	ZER
1	EA	THRESHOLD	103A-223 (OR PER SILL DETAIL)	A	ZER

INSTALL HEAD SEAL BEFORE CLOSER.

HW SET: 06

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY LOCK	L9071HD 06A L283-711	626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)	626	IVE
1	SET	GASKETING	328AA-S	AA	ZER

HW SET: 07

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY LOCK	L9071HD 06A L283-711	626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS401CCV/WS402CCV (AS REQ'D)	626	IVE
1	SET	GASKETING	328AA-S	AA	ZER

HW SET: 08

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY LOCK	L9071HD 06A L283-711	626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	SET	GASKETING	328AA-S	AA	ZER

HW SET: 09

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	POWER TRANSFER	EPT10 CON	✓	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	QELX-AX-98-L-NL-F-06-CON	✓	626	VON
1	EA	SFIC MORTISE CYL.	80-132 (KEY SWITCH)		626	SCH
1	EA	SFIC RIM CYLINDER	80-159		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TORX		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS401CCV/WS402CCV (AS REQ'D)		626	IVE
1	SET	DOOR SEAL	770AA-S (HEAD & JAMBS)		AA	ZER
1	EA	DOOR BOTTOM	355AA		AA	ZER
1	EA	THRESHOLD	545A-223 (OR PER SILL CONDITION)		A	ZER
1	EA	MOUNTING BRACKET	770SPB			ZER
1	EA	WIRE HARNESS	CON-XX (LENGTH AS REQ'D)	✓		SCH
1	EA	KEY SWITCH	653-04 L2 12/24 VDC	✓	630	SCE
1	EA	POWER SUPPLY	PS902 900-2RS-FA 120/240 VAC	✓		VON

DURING PERFORMANCES THE EXIT DEVICE CAN BE ELECTRICALLY DOGGED (UNLATCHED) VIA THE KEY SWITCH FOR QUIET PUSH/PULL OPERATION.
WIRE ELECTRIFIED EXIT DEVICE INTO THE FIRE ALARM SYSTEM FOR IMMEDIATE RELEASE UPON ACTIVATION.
FREE EGRESS AT ALL TIMES.

HW SET: 10

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SEC HOLDBK	L9077HD 06A L283-711	626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)	626	IVE
1	SET	DOOR SEAL	770AA-S (HEAD & JAMBS)	AA	ZER
1	EA	DOOR BOTTOM	355AA	AA	ZER
1	EA	THRESHOLD	545A-223 (OR PER SILL CONDITION)	A	ZER

HW SET: 11

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	KEYED PRIVACY	L9456HD 06A L583-363 L283-722	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS401CCV/WS402CCV (AS REQ'D)	626	IVE
1	SET	GASKETING	328AA-S	AA	ZER
1	EA	THRESHOLD	AS DETAILED	A	ZER
1	EA	COAT AND HAT HOOK	554	626	IVE

SIGNAGE AS REQUIRED

HW SET: 12

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	CLASSROOM HOLDBK	L9076HD 06A	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)	626	IVE
1	SET	GASKETING	328AA-S	AA	ZER
1	EA	THRESHOLD	AS DETAILED	A	ZER

SIGNAGE AS REQUIRED

HW SET: 13

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	L9070HD 06A	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
2	EA	WALL STOP	WS401CCV/WS402CCV (AS REQ'D)	626	IVE
1	EA	ASTRAGAL	47A	A	ZER
2	EA	SILENCER	SR64	GRY	IVE

HW SET: 14

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	L9070HD 06A	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
2	EA	WALL STOP	WS401CCV/WS402CCV (AS REQ'D)	626	IVE
1	EA	ASTRAGAL	47A	A	ZER
2	EA	SILENCER	SR64	GRY	IVE

HW SET: 15

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080HD 06A	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4041 DEL RW/PA TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS401CCV/WS402CCV (AS REQ'D)	626	IVE
1	SET	GASKETING	328AA-S	AA	ZER

COORDINATE WITH LIFT MANUFACTURER.

HW SET: 16

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080HD 06A	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	SET	GASKETING	328AA-S	AA	ZER

HW SET: 17

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY LOCK	L9071HD 06A L283-711	626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP HW/PA TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)	626	IVE
1	SET	GASKETING	328AA-S	AA	ZER

HW SET: 18

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080HD 06A	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)	626	IVE
1	SET	GASKETING	328AA-S	AA	ZER

HW SET: 19

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-EO	626	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-NL-OP-110MD	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	SFIC MORTISE CYL.	80-132 X K510-730 (MULLION)	626	SCH
2	EA	SFIC MORTISE CYL.	80-132 XQ11-948 (DOGGING)	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
4	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	4040XP EDA TORX	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)	626	IVE
1	SET	DOOR SEAL	770AA-S (HEAD & JAMBS)	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
2	EA	MOUNTING BRACKET	770SPB		ZER

HW SET: 20

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
2	EA	PANIC HARDWARE	CDSI-PA-AX-98-L-BE-06	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	SFIC MORTISE CYL.	80-132 X K510-730 (MULLION)	626	SCH
2	EA	SFIC MORTISE CYL.	80-132 XQ11-948 (DOGGING)	626	SCH
3	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	4040XP EDA TORX	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	WALL STOP	WS401CCV/WS402CCV (AS REQ'D)	626	IVE
1	SET	DOOR SEAL	770AA-S (HEAD & JAMBS)	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
2	EA	MOUNTING BRACKET	770SPB		ZER

HW SET: 21

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-EO	626	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-L-NL-06	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	SFIC MORTISE CYL.	80-132 X K510-730 (MULLION)	626	SCH
2	EA	SFIC MORTISE CYL.	80-132 XQ11-948 (DOGGING)	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
4	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA TORX	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)	626	IVE
2	EA	WALL STOP	WS401CCV/WS402CCV (AS REQ'D)	626	IVE
1	SET	DOOR SEAL	770AA-S (HEAD & JAMBS)	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
2	EA	MOUNTING BRACKET	770SPB		ZER

HW SET: 22

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	628	IVE
2	EA	PUSH PLATE	8200 8" X 16"	630	IVE
2	EA	PULL PLATE	8302 10" 4" X 16"	630	IVE
2	EA	SURFACE CLOSER	4040XP EDA TORX	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)	626	IVE
1	EA	WALL STOP	WS401CCV/WS402CCV (AS REQ'D)	626	IVE
1	EA	MEETING STILE	328AA-S	AA	ZER
1	SET	DOOR SEAL	770AA-S (HEAD & JAMBS)	AA	ZER
2	EA	MOUNTING BRACKET	770SPB		ZER

WALL STOP @ 180 DEG SWING (RHR).

HW SET: 23

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	PADLOCK	KS43F2300 (IF NEEDED)	625	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH

BALANCE OF HARDWARE PROVIDED BY DOOR MANUFACTURER

HW SET: 24

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050HD 06A L583-363	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)	626	IVE
1	SET	GASKETING	328AA-S	AA	ZER

HW SET: 25

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	CLASSROOM SECURITY LOCK	L9071HD 06A L283-711	626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ TORX	689	LCN
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)	626	IVE
1	EA	DOOR SEAL/SWEEP	PROVIDED BY DOOR MANUFACTURER		B/O

HW SET: 26

ALL HARDWARE PROVIDED BY GATE MANUFACTURER

END OF SECTION

SECTION 08 8000

GLASS AND GLAZING

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 1 - General Requirements apply to this section.

B. Section Includes:

1. Glass and glazing as indicated.

C. Related Sections:

1. Section 08 1113: Hollow Metal Doors.

2. Section 08 7100: Door Hardware.

3. Section 08 4113: Aluminum Storefronts.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's descriptive literature and installation recommendations for glass, glazing and accessories

B. Material Samples: Submit 6-inch square units of each type of glass specified.

1.03 QUALITY ASSURANCE

A. Labeling: Label each piece of glass and glazing and mirrors with manufacturer's name, and the grade or quality of the material. Labels shall be intact before and after installation.

B. Comply with the following as a minimum requirement:

1. ASTM C 1036 - Standard Specification For Flat Glass.

2. ASTM C 1048 - Standard Specification For Heat-Treated Flat Glass.

3. ASTM E 774 - Standard Specification For Sealed Insulated Glass Units.

4. CPSC 16 CFR 1201 - Safety Standards for Architectural Glazing Materials issued by the Consumer Products Safety Commission.

5. GANA - Glazing Manual.

C. Qualifications of Installer: Minimum 10 years experience installing glass in projects of similar scope and complexity.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver glass and glazing materials with manufacturer's labels intact.

B. Do not remove labels until glass has been installed and inspected by IOR.

C. Protect glass from staining, marking or damage.

D. Putty and glazing compound shall be delivered to the Project site in manufacturer's original unbroken containers labeled to identify contents.

1.05 PROJECT CONDITIONS

A. Perform glazing when ambient temperature is above 40 degrees F.

B. Perform glazing on clean, dry surfaces only.

1.06 WARRANTY

A. Warrant system to be watertight and free from distortion or harmonics for a period of 10 years. Warrant coatings and thermally or acoustically rated insulation units against deterioration in acoustic or thermal rating for a period of 20 years.

B. Provide a two (2) year unconditional warranty commencing on recorded date of the Notice of Completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND FABRICATORS

A. To maximum extent possible, provide domestically manufactured and fabricated glass, and provide glass from one manufacturer.

B. Types of glass specified or indicated shall be manufactured or fabricated by one of the following:

1. Pilkington LOF.

2. Vitro Architectural Glass.

3. Viracon.

2.02 GLASS MATERIALS

A. General: Conform to ASTM C 1036, ASTM C 1048 and to ANSI Z97.1. Label factory cut panes.

B. **Type G-1 – Tinted 1" Insulated Glass**: Pre-assembled sealed lite units with dehydrated space between glass units, complying with ASTM E 774 for Class CBA units:

- ¼" Vitro SolarBan 70 on SolarGray (2)
- ½" air space
- ¼" clear.

C. **Type G-1T – Tinted 1" Insulated Glass - Tempered**: Units per Type G-1, except glass shall be tempered.

D. **Type G-1S – Spandrel 1" Insulated Glass**: Pre-assembled sealed lite units with dehydrated space between glass units, complying with ASTM E 774 for Class CBA units:
- ¼" Vitro SolarBan 70 on SolarGray (2)
- ½" air space
- 1/8" clear
- 0.060 black PVB interlayer
- 1/8 clear

E. **Type G-2 – Tinted 1" Insulated Glass - Obscure**: Pre-assembled sealed lite units with dehydrated space between glass units, complying with ASTM E 774 for Class CBA units.. 1/8" Clear
- ¼" Vitro SolarBan 70 on SolarGray (2), acid-etched with Walker Textures Satin finish on surface (1)
- ½" air space
- ¼" clear.

3

F. ~~**Type G-2T – Tinted 1" Insulated Glass – Obscure, Tempered**: Units per Type G-2, except glass shall be tempered.~~

G. ~~**Type G-3 – Clear 1" Insulated Glass**: Pre-assembled sealed lite units with dehydrated space between glass units, complying with ASTM E 774 for Class CBA units:~~
- ~~¼" Vitro SolarBan 70 on clear glass (2)~~
- ~~½" air space~~
- ~~¼" clear.~~

H. ~~**Type G-3T – Clear 1" Insulated Glass - Tempered**: Units per Type G-3, except glass shall be tempered.~~

I. **Type G-4 – Clear Glass**: ¼" clear glass.

J. **Type G-4T – Clear Glass - Tempered**: ¼" clear glass, tempered.

3

K. **Type G-6 – Tinted 1" Insulated Glass**: Pre-assembled sealed lite units with dehydrated space between glass units, complying with ASTM E 774 for Class CBA units:
- ¼" Vitro SolarBan 70 on Custom Yellow Tinted (2)
- ½" air space
- ¼" clear.

L. **Type G-6S – Spandrel 1" Insulated Glass**: Pre-assembled sealed lite units with dehydrated space between glass units, complying with ASTM E 774 for Class CBA units:
- ¼" Vitro SolarBan 70 Custom Yellow Tinted (2)
- ½" air space
- 1/8" clear
- 0.060 black PVB interlayer
- 1/8 clear

2.03 GLASS SETTING MATERIALS

A. Setting Blocks: ASTM C 864, channel shape; having 1/4 inch internal depth, Shore A hardness of 80 to 90 Durometer. Blocks shall be a minimum 2 inch long. Block width shall be approximately 1/16 inch less than the full width of the rabbet. Block thickness shall be at least 3/16 inch, sized for rabbet depth as required.

B. Spacers: ASTM C 864, channel shape, with 1/4 inch internal depth, 3/32 inch flanges, web, 1/8 inch thick, one to 3 inches long. Spacers shall provide Shore A hardness of 40 to 50 Durometer.

C. Vinyl Glazing Channels: Profile compatible with framing system and designed to accommodate glass of specified thickness, light gray in color. Provide for dry glazing aluminum frames where indicated or permitted.

D. Glazing Tape: Poly-isobutylene based sealant tape, conforming to AAMA 804.1, with adhesive one side protected by temporary paper cover, Extru-Seal manufactured by Pecora Corp., No. 303 by Protective Treatments, Inc., or equal.

E. Spring Steel Spacers: Galvanized steel wire or strip designed to position glazing in channel or rabbet sash with stops.

F. Glazing Clips: Galvanized steel spring wire designed to hold glass in position in rabbet sash without stops.

G. Glazing Points (Sprigs): Pure zinc stock, thin, flat, triangular or diamond-shaped pieces, 1/4 inch minimum size.

H. Glazing Sealants for Metal Sash: GE Silicones Silglaze II 2800, GE Silicones Silpruf, GE Silicones 1200 Silicone, and Dow Corning 999A. Polybutylene, oleoresinous, asphalt, and oil base sealants are not permitted. Provide sealant of same color as structural silicone sealant unless otherwise required.

I. Glazing Compound for Wood Sash: Acrylic latex caulk by Tremco. Provide for bedding and caulking glass in wood frames.

J. Glazing Compounds and Sealants for Thermoplastic: Provide silicone, butyl, or polysulfide glazing compound.

K. Mirror Setting Materials: Manufactured by Palmer Products Corporation, or equal, for installation of mirrors, and as follows:

1. Mirror backing paint: Mirro-Bac Paint, or equal, formulated to protect mirror silvering.

2. Mirror bond coat: Mirro-Mastic Bond, or equal, formulated to isolate deleterious backing materials from mastic and mirror.

3. Mirror mastic: Mirro-Mastic, or equal, formulated for adhering mirrors and glass to substrates. Shall comply with CDPH Standard Practice Testing.

2.04 SPEAK HOLES

A. Speak holes shall be stock No. 444, 4 inches outside diameter, 3 inches inside diameter for 1/4 inch plate glass, stainless steel as manufactured by Nissen and Co., or equal.

PART 3 - EXECUTION

3.01 TOLERANCES

A. Thickness indicated or specified are nominal within standard tolerances. Maximum size of vertical panes shall not exceed following:

Glass Thickness Double Strength:	1/8 inch	3/16 inch	1/4 inch
Maximum Areas in Square Feet:	12	16	20

3.02 INSTALLATION, GENERAL

A. Glazed cabinet doors, windows, transoms, and fixtures, not otherwise noted or indicated, shall be glazed with clear float glass. Room or entrance doors shall be glazed with clear wire glass.

B. Obscure glass in exterior openings shall be installed with smooth side of glass to weather. Patterned glass shall be installed with pattern running vertically, unless otherwise indicated.

C. Glazing tapes or sealants shall be installed wherever glass contacts wood or metal surfaces. Width of strips shall be as required.

D. Glazing compound shall be neatly and cleanly installed in straight lines, even with inside edge of sash members. Thumb puttying is not permitted.

E. Display Cases and Sliding Glass Doors in Casework: Glass in display cases shall be 1/4 inch thick clear wire glass or float glass as indicated. Edges of glass shall be rounded and polished.

F. Serving windows in cafeterias with speak holes shall be tempered glass.

G. Glazing Aluminum Sash: Glazing material in aluminum sash shall be installed in compound and secured in place with aluminum glazing beads. In addition, horizontal beads shall be installed with 6 inch x one inch, type A, self-tapping, stainless steel, Phillips-head screws, installed into pre-drilled, counter-sunk holes and spaced 2 inches from each end and 9 inches on centers.

H. Speak holes shall be installed according to glass manufacturer's written recommendations.

3.03 INSTALLATION OF GLASS

A. Conform to requirements of GANA Glazing Manual.

B. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.

C. Provide compressible filler rods or equivalent back-up material to prevent sealant from extruding into glass channel weep systems, from adhering to back surface of joints and to control depth of sealant for optimum performance.

D. Force sealants into glazing channels, in manner to eliminate voids and to ensure complete bond of sealant to glass and channel surfaces.

E. Tool exposed surfaces of sealants to provide for drainage away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

F. Where dry glazing of aluminum frame is indicated or permitted, provide vinyl glazing channels installed in accordance with frame manufacturers written recommendations. Do not stretch channels. Miter corners.

G. For tape glazing, furnish tape of thickness to provide approximately 30 percent compression. Cut tape to proper length and install to permanent stops, the entire length of the head and sill first, then to jambs. Butt tape together with no overlap and remove paper backing. Install glass on setting blocks at quarter points and maintain uniform glass edge clearance around entire perimeter of glass. Maintain manufacturer's recommended edge clearance and bite on glass. Install glass firmly into tape with a slight lateral movement to assure proper adhesion. Install tape to removable stop with evenly distributed firmness, smoothing out wrinkles in tape. Secure removable stop in proper position so tape makes contact with glass as stop is installed, forcing contact with glass and completely sealing joint. Remove excess tape from both sides at slight angle over sight line. Do not undercut.

H. Glass in Wood Frames: Install glass with glazing points and setting blocks as required. Seal glass with glazing compound and secure with wood stops. Install stops with fine finishing nails, and set for putty stopping.

I. Patterned Glass: Install glass with one patterned smooth surface on the weather side.

J. Wire Glass: Install glass for fire doors in accordance with installation requirements of NFPA 80.

K. Laminated Glass: Sashes, which are to receive laminated glass, shall be weeped to the outside to permit water in the channel to drain from the frame.

L. Unframed Mirrors: Walls shall be clean, dry, plumb, rigid and smooth. Install mirror backing paint to back of mirror and to edges. Install mirror bond coat over painted backing, wood backing, concrete and masonry to receive mirrors. Bond coat is not required over vitreous surfaces. Install sufficient mirror adhesive to provide 100 percent coverage when mirror is installed. Install mirror into place, providing 3/16 inch clearance between mirror and substrate. Support mirrors with temporary edge channels to allow mastic set-up, and where indicated or required, provide permanent top and bottom edge channels.

M. Framed Mirrors: Walls shall be clean, dry, plumb, rigid and smooth. Install mirrors with concealed mounting devices, and secure with concealed screws on bottom of mirror. Conform to manufacturers written recommendations.

3.04 PROTECTION AND CLEANING

A. Protect exterior glass from breakage by furnishing crossed streamers attached to framing and away from glass surface. Do not directly install markers to glass surfaces. Remove non-permanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

D. Remove and replace glass, which is broken, chipped, cracked, abraded, or damaged during construction.

E. Remove protective covering from thermoplastic not more than 4 days before Final completion, and immediately before cleaning. Methods of final cleaning and finishing shall be as prescribed by thermoplastic glazing publications referenced above.

F. Wash glass on both faces not more than 4 days before Final completion. Wash glass by method recommended by glass manufacturer. Do not furnish harsh cleaning agents, caustics, abrasives, or acids for cleaning. Polish glass both sides and leave free of soil, streaks, and labels.

3.05 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.06 PROTECTION

A. Protect the Work of this section until Final Completion.

END OF SECTION

SECTION 09 2216

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior and Exterior non-structural metal framing.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 07 2500 – Weather/Air Barriers

3. Section 09 2520 – Gypsum Sheathing

4. Section 09 2900 - Gypsum Board.

5. Section 09 2420 – Furring and Lathing.

6. Section 09 2423 – Portland Cement Plaster

1.02 PROJECT REQUIREMENTS

A. Regulatory Requirements: Comply with DSA and CBC requirements.

B. Design Requirements:

1. Metal Studs: Studs for interior partitions shall be roll-formed channel or C-shapes.

2. Track: Stud track for floor and ceiling anchorage shall be channel configuration, sized to fit studs. Galvanized steel as manufactured for installation with specified metal studs.

3. Design: Design is based on minimum 5 pounds per square foot load applied perpendicular to walls. Deflection shall not exceed 1/240 under design load.

B. Performance Requirements:

1. The top track fire-rated assembly, when incorporated into stud systems and tested in conjunction with products specified in Section 07 8413, shall exhibit the following performance characteristics:

a. Cyclic System: When tested for cyclical movement, in accordance with UL 2079. Assembly shall achieve 500 cycles of wall movement at 35 to 40 cycles per minute.

b. When subsequently tested for 1 and 2 hour fire-resistive rated construction, in accordance with ASTM E119 and ASTM E814, assembly shall conform to requirements for hose stream resistance.

1.03 SUBMITTALS

A. Shop Drawings: Submit drawings showing framing, connection details, accessories and anchorage. Indicate location of assemblies and size and spacing of framing components.

B. Product Data: Submit manufacturer's catalog data for each item proposed for installation.

C. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.

1.04 DEFINITIONS

A. Cyclic Anchoring Method: A system which provides for positive attachment (as described in ASTM C754) of studs to upper track, and of track to overhead structure, while permitting up to 1-inch of vertical movement.

B. System: The application of the above products in their entirety as tested. There can be no intermixing of components unless specifically outlined in the appropriate test reports.

1.05 QUALITY ASSURANCE

A. Coordinate with related Work to provide blocking for items mounted on finished surfaces and to provide allowances for pipes and other items inside partitions and walls.

B. Comply with following as a minimum requirement:

1. American Welding Society (AWS): Structural Welding Code Steel (D1.1); and Structural Welding Code Sheet Steel (D1.3).

2. ASTM Standards:

a. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

b. ASTM A1003 –Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.

c. ASTM A641 – Standard Specification for Zinc Coated (Galvanized) Carbon Steel Wire.

d. ASTM C645 – Standard Specification for Non-Structural Steel Framing Members.

e. ASTM C955 – Standard Specification for Load Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging, for Screw Application of Gypsum Panel Products and Metal Plaster Bases.

f. ASTM C954 – Standard Specification for Steel Drill Screws for Application of Gypsum Panel Products or Metal Bases to Steel Studs From 0.033 Inch to 0.112 Inch in Thickness.

g. ASTM E1190 – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.

C. Tolerances: Install walls and partitions on straight lines, plumb, free of twists or other defects, and contacting a 10 foot straightedge for its entire length at any location within a 1/8 inch tolerance. Install horizontal framing level within a tolerance of 1/8 inch in 12 feet in any direction.

D. Manufacturers shall be members of Steel Stud Manufacturers Association (SSMA).

1.06 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered in their original unopened packages and stored protected from damage. Do not store material directly on grade. Provide adequate support to prevent bowing of material prior to installation.

B. Store welding electrodes in accordance with AWS D12.1.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Non-structural metal framing:

1. Clark-Dietrich Building Systems, Inc. (ICC ESR-166P)

2. Marino/Ware. (ICC ESR-2620)

3. Cemco. (ICC ESR-2012)

4. Equal.

B. Top Track Systems:

1. Sliptrack System by Dietrich Industries., Inc. or equal. Down-standing legs shall be nominally 2 1/2-inch and shall be provided with 1 1/2-inch slots at 1 inch on center.

2. VertiTrack or VertiClip System by The Steel Network, Inc. or equal. Pre-assembled track with clips installed to match stud spacing. Clips with attached bushing and screws to allow stud movement.

3. System must provide for minimum tested overall movement of 1 inch: ½ inch in each direction.

4. Track shall be provided in standard widths of 3-5/8 and 6 inches and in 16, 18, and 20 gage (54, 43, and 33 mil) sheet steel thickness, as required by Project conditions and detailed.

2.02 MATERIALS

A. Light Gage Metal Framing:

1. Metal framing shall be formed from corrosion resistant-steel conforming to requirements of ASTM A653, 33 ksi minimum.

2. Metal framing shall be zinc coated in conformance to requirements of ASTM A924, G60.

3. Metal framing shall be manufactured in conformance to ASTM C645.

4. Install metal framing according to ASTM C1007, Standard Specification for Installation of Load-Bearing (Transverse and Axial) Steel Studs and Related Accessories.

B. Studs: SSMA, ICC-ES ER-4943P, minimum yield 33 ksi, hot-dipped galvanized or electro galvanized sheet steel, G-60, C Stud type, punched web (except tracks and joists), C-shaped, sizes required to conform to details and scheduled wall thicknesses. Studs shall be rolled from new steel sheet and shall not be produced from re-rolled steel. Stud flanges shall not be less than 1 5/16-inch wide; track flanges, not less than 1 ¼-inch wide.

1. Wall Framing and Furring for Plaster and Mortar Beds: Studs and tracks shall be 18 gage (43 mil) minimum, unless otherwise indicated.

2. Wall Framing and Furring for Gypsum Wallboard: Studs and tracks shall be 20 gage (33 mils) minimum, unless otherwise indicated.

3. Stud gages indicated on Drawings or specified are the minimum. Where required stud height and/or loads exceed code requirements or manufacturer's recommendations, provide heavier gage studs and/or decrease stud spacing as necessary to conform to code requirements.

C. Suspended and Furred Ceiling Systems and Wall Furring: Suspended ceiling framing system shall support finished ceiling, light fixtures, air diffusers, and accessories, as required. Suspension system shall provide a maximum deflection of L/240. Carrying channels shall be fabricated from minimum 0.0548 inch thick cold-rolled steel, 1 ½-inch wide by 7/16 inch deep. Carrying channels for supports under ducts shall be 2 inches in size as specified. Carrying channels shall be fabricated from hot-dip galvanized coated sheet.

1. Plaster Ceilings: Cross furring members shall conform to ASTM C 645, and shall be fabricated from cold-rolled steel, 3/4 inch wide by 7/16 inch deep. Furring members shall be fabricated from hot-dip galvanized coated sheet.

2. Gypsum Wallboard Ceilings: Furring members shall be fabricated from cold-rolled steel, 7/8 inch by 2 9/16-inch. Furring members shall be fabricated from hot-dip galvanized coated sheet.

D. Framed Ceilings: Framed ceiling framing system shall support finished ceiling, light fixtures, air diffusers, and accessories, as required. Suspension system shall provide a maximum deflection of L/240.

1. Plaster and Gypsum Wallboard Ceilings: Ceiling joists shall conform to ASTM C645, hot-dip galvanized coated steel, C-shaped, unpunched, 20 gage (30 mil) minimum, unless noted otherwise.

E. Shaft Wall Framing Members: CH studs and J runners, 20 gage (30 mil) minimum for 2, 4 or 6 inch studs, conforming to ASTM C645, fabricated of steel conforming to ASTM A653, hot-dip galvanized.

F. Framing Accessories: Provide standard related accessories including floor and ceiling tracks, clips, web stiffeners, anchors, and similar items, of same manufacture as each type of stud specified, and as required for a complete installation.

G. Splay Wires and Compression Struts: Approved manufacturers acceptable to manufacturer of ceiling grids, gages and types as required by building codes for ceiling types and weights specified.

H. Wires: Soft-annealed galvanized steel wire, 8 gage for hanger wires and 16 gage for framing unless otherwise specified.

I. Fasteners: Wafer-head screws, self-drilling type for 20 gage (30 mil) metal and heavier. ASTM C954 self-drilling, self-tapping screws, Type S-12 pan head, ½ inch long.

J. Fire Rated Acoustical Foam Tape: Compressible, closed cell polyvinyl chloride foam with pressure sensitive adhesive, in rolls with protective release liner on non-adhesive face, 6 pounds per cubic foot density, 1 inch wide x not less than 1/4 inch thick, self-extinguishing, UL 94 recognized, Norseal V740FR, manufactured by Norton Performance Plastics Corporation, or equal.

K. Acoustical Sealant: Permanently resilient type, non-hardening, as specified in Section 07 9200.

L. Zinc-Rich Paint: Conform to Fed Spec DOD-P-21035A, Z.R.C. "Cold Galvanizing Compound", manufactured by ZRC Products Company, or equal. Provide for touch-up of galvanized surfaces.

M Steel Backing Plates: Provide a minimum 4 inch wide by l6 gage (54 mil) steel, or sections of studs and stud track welded or fastened to web of studs, except as otherwise indicated. Apply shop coat of metal primer.

N. Anchorage Devices Powder Actuated: Minimum 0.177 inch diameter by 1-7/16 inch long fasteners in regular concrete and 0.145 inch diameter by 1 1/8-inch long fasteners in lightweight concrete. Allowable shear and tension values as permitted in ICC ES reports shall be reduced to 80 percent.

O. Anchorage Devices, Drilled Expansion Anchors: Minimum 3/8 inch diameter with 2-1/4 inch embedment. Allowable shear and tension values as permitted in ICC ES reports shall be reduced to 80 percent.

P. Top Track System Materials:

1. Forming steel shall be mill certified prime steel:

   a. For 0.064 inch sections, conform to ASTM A1011, Grade 50 with a minimum yield point of 50,000 psi.

   b. For 0.048 and 0.036 inch sections, conform to ASTM A1008, Grade C, with a minimum yield point of 33,000 psi.

   c. Formed steel shall be provided with galvanizing in accordance with ASTM A653 for a Class G90 zinc coating.

2. Fasteners:

a. For attachment of steel studs to slotted track or deflection clip, minimum No.8 corrosion resistant by ½ inch waferhead screws.

b. For attachment of track system to overhead structural element or metal decking, as provided for by the structural details affecting the Work.

3. Sprayed-on Fireproofing

a. Sprayed-on fireproofing shall be as specified in Section 07 8116 - Cementitious Fire Proofing.

4. Dry Method.

a. Dry mineral wool and sealant system shall use only such products as are represented to have been fully tested and approved under UL 2079 and as specified in Section 07 8413 - Penetration Firestopping.

b. Mineral wool shall be compressed to the degree as used on approval fire and hose stream test.

c. The system supplier shall provide a measuring device capable of determining compression to determine compliance with required density.

Q. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1 1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

R. Resilient Furring Channels: 1/2-inch-deep, steel members designed to reduce sound transmission.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that overhead or concealed Work is completed, tested, inspected, and finished as required before starting Work of this section.

3.02 INSTALLATION

A. Walls and Partitions:

1. Fasten floor runners for exterior walls and interior partitions to concrete slab with required power driven fasteners. Spacing of fasteners not to exceed 24 inches on center. Fasten ceiling runners to structure as by top track system manufacturer.

2. Sound insulated walls and partitions: Embed floor runner tracks in two beads of acoustical sealant or two runs of compressible tape seal. Install top track nested into slotted track system, in same manner for full height of walls. Where wall ends abutting concrete, masonry, or steel set end studs in two beads of acoustical sealant or two tape seals and secure at 4-foot centers vertically.

3. Space studs not over 16 inches on center unless indicated otherwise. Studs shall be located approximately 2 inches from door frame jambs, abutting partitions and partition corners, except those providing support for door and window openings.

4. Furnish and install manufacturer's standard floor track. Fasten track to floor by means of 1/4 inch by 1 1/4-inch Star "Dryvin" hammer drive anchors or 3/16 inch by 1 inch round head, "Rawl-Drives" one-piece expansion bolts spaced not to exceed 3 feet, and installed in drilled holes in slab, or to wood joist with nails as indicated. Track may be fastened to concrete floor slabs with, power-driven fasteners.

5. Studs shall be seated squarely in track with stud web and flanges abutting track web, plumbed and securely fastened with sheet metal screws, to flanges or web of both floor and top tracks. Provide 4 screws per stud.

6. Where there is no suspended ceiling, tops of stud walls shall be provided with track and shoes and be fastened as specified for floors. Welding of studs to ceiling track will not be permitted except where bearing studs are installed.

7. Over metal doorframes, install a cut-to-length section of runner track, with flanges slit and web-bent to allow flanges to overlap adjacent vertical studs, and securely fasten to studs. At doorjambs, extend studs continuous to structure above.

8. Bridging, or horizontal bracing of 1 1/2-inch, cold-rolled channels shall be fastened in a manner to prevent stud rotation. Bridging shall be furnished as follows: walls up to 10 feet high, one row at mid-height; walls exceeding 10 feet high, bridging or bracing rows spaced not to exceed 5 feet on center.

9. Wind bracing shall be fastened where indicated on Drawings. Minimum size of strap shall be as indicated on Drawings. Track where strap terminates shall be anchored as indicated on Drawings.

B. Plaster Ceiling Suspension System:

1. Provide horizontal furring in accordance with CBC Section 2507.

2. Hanger Wires:

a. Hanger wires for ceilings suspended from wood frame construction shall be installed in accordance per DSA IR 25-1 and 25-4 and shall be fastened with stem lag screws in bottom edge of joists or rafters. Wire shall be looped through hole in stem lag screw and then wrapped twice around it. Stem lag screws shall be "Stanlag Screws" by Stanline, Inc., or equal, of type and penetration as follows:

Type Size	Hanger Wire	Screw Penetration, Minimum
Stanlag #SLS-3	#12 & #10 (0.104 and 0.128 inch diameter)	1 1/4-inch
Stanlag #SLS-375	#9 & #8 (0.144 and 0.160 inch diameter)	1 1/2-inch

b. Hanger wire shall be wrapped twice around runner channel, drawn up taut, and wrapped twice around itself.

3. Runner channels shall be installed 6 inches maximum from walls, parallel to runners. Splices in runner channels shall be provided at hangers only, by lapping channels not less than 12 inches and tying channels together at 2 points with a double wrap of tie wire twisted up taut.

4. Ends of runner channels abutting concrete or masonry surfaces shall be 1 ¼-inch clear and shall be tied to wall or partition with 3/4 inch channel brackets providing a 4-inch right angle bend secured with two 1/4 inch by 1 inch power-driven fasteners. Brackets shall extend from face of surface not less than 8 inches and shall be tied to runner channels at two points with double wrap of tie wire twisted up taut.

5. Securely saddle-tie furring channels to runner channels at each crossing with 16 gage (0.064 inch diameter) tie wire twisted up taut, and with wings left uncut and bent back.

C. Gypsum Wallboard Ceiling Suspension and Framing: Suspended ceiling system framing shall be installed in accordance with ASTM C754, and as follows.

1. Hangers shall be spaced not more than 48 inches along runner channels and 36 inches in other direction or 42 inches in both directions unless otherwise indicated. Locations of hanger wires shall be coordinated with other Work. Hangers at ends of runner channels shall be located not more than 6 inches from walls. Hanger wire shall be fastened to structural elements with required fasteners. Sags or twists, which develop in suspended system, shall be adjusted. Damaged or faulty parts shall be replaced.

2. Main Runners: Hanger wires shall be double strand saddle-tied to runner channels and ends of hanger wire shall be twisted three times around itself. Main runners shall be located to within 6 inches of parallel wall to support ends of cross furring. Main runners shall not come in contact with abutting masonry or concrete walls. Where main runners are spliced, ends shall be overlapped 12 inches with flanges of channels interlocked, and shall be securely tied at each end of splice with wire looped twice around channels.

3. Furring channels shall be fastened to runner channels and to structural supports at each crossing with tie wire, hairpin clips, or required fastenings. Furring channels shall be located within 2 inches of parallel walls and beams, and shall be cut 1/2 inch short of abutting walls.

4. Ceiling Openings: Support members shall be provided as required at ceiling openings for access panels, recessed light fixtures, and air supply or exhaust. Support members shall be not less than 1 1/2-inch main runner channels and vertically installed suspension wires or straps shall be located to provide at least minimum support specified for furring and wallboard attachment. Intermediate structural members not a part of structural system, shall be provided for attachment or suspension of support members.

5. Light fixtures and air diffusers shall be supported directly from suspended ceiling runners. Wires shall be provided at required locations to support weight of recessed or surface mounted light fixtures and air diffusers.

6. Control Joints: Ceiling control joints for expansion and contraction shall be located where indicated on drawings. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.

   a. Interior Ceilings with Perimeter Relief: Control joints shall be installed so linear dimensions between control joints shall not exceed 50 feet in either direction or more than 2,500 square feet in area.

b. Interior Ceilings without Perimeter Relief: Control joints shall be installed so linear dimensions between control joints shall not exceed 30 feet in either direction nor more than 900 square feet in area.

D. Splay Wires and Compression Struts: Install as detailed and as required to prevent upward and sideward motion under seismic conditions, as required by code.

E. Suspension Under Ducts: For hangers spaced at 4 to 5 ½-foot centers, provide 6 gage (0.192 inch diameter) hanger wires with minimum 2 inch runner channels spaced at maximum 48 inch centers. For greater spans, design system for live load of l0 pounds per square foot of area plus dead load and provide a detail in Shop Drawings.

F. Furring: Provide framing for horizontal furring as shown or required. Conform to above requirements as applicable.

3.03 CLEANING

A. Remove debris, rubbish, and waste material and legally dispose of off Project site.

3.04 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 2226

SUSPENDED DRYWALL GRID SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General Conditions and Division 1 - General Requirements Specification sections apply to work of this section.

1.02 SUMMARY

A. Section Includes:
1. Suspension System Framing and Furring for Plaster and Gypsum Board Assemblies
2. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

B. Related Sections:
1. Section 09250 - Gypsum Board
2. Division 15 Sections - Mechanical Work
3. Division 16 Sections - Electrical Work

C. Alternates
1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been approved by Addenda, the specified products shall be provided without additional compensation.
2. Submittals, which do not provide adequate data for the product evaluation, will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Furring System component profiles and sizes; Compliance with the referenced standards.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
3. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability"
4. ASTM B 117 Standard Practice for Operating Salt Spray (Fog) Apparatus
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM C 645 Standard Specification for Nonstructural Steel Framing Members
8. ASTM C 754 Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board

9. ASTM C1002 Standard Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.
10. ASTM E 119 Standard Test Method for Fire Tests of Building Construction and Material (if applicable).

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical literature.

B. Samples: 8 inch long samples of suspension system components, including main runner, cross tees and angle molding.

C. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: To ensure proper interface, all drywall furring components shall be produced or supplied by a single manufacturer.

B. All accessory components from other manufacturers shall conform to ASTM standards.

C. Fire Resistance Ratings: As indicated by reference to design designations in UL Fire Resistance Directory, for types of assemblies in which drywall ceilings function as a fire protective membrane and tested per ASTM E 119. Installation in accordance with the UL Design being referenced.

D. Coordination of Work:
1. Coordinate drywall furring work with installers of related work including, but not limited to acoustical ceilings, building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.
2. All work above the ceiling line should be completed prior to installing the drywall sheet goods. There should be no materials resting against or wrapped around the suspension system, hanger wires or ties.

E. Pre-installation Conference: Conduct conference at Project site. Comply with requirements in Division 1 - General Requirements Section "Quality Requirements." Review methods and procedures related to Suspended Drywall Grid System including, but not limited to, the following:

1. Meet with District, Architect, District's insurer if applicable, testing and inspecting agency representative, Suspended Drywall Grid System, and installers whose work interfaces with or affects Suspended Drywall Grid System including installers of acoustical ceilings, building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

2. Review methods and procedures related to Suspended Drywall Grid System installation, including manufacturer's written instructions.

3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

F. Mockup:

1. Before beginning work, erect a mockup at a location on the site acceptable to the Architect to demonstrate proposed Suspended Drywall Grid System and associated sealants, and trim necessary to form the Suspended Drywall Grid System as shown on the drawings including construction, installation methods, coordination of the work specified in other relevant sections, accessories, features, color and texture.

2. The Architect will select mockup size and features, but in no case shall it be less than 5 feet long by 7 feet wide.

    a. Use same personnel, materials and construction techniques intended to be used for the Project, including the selected fasteners specified.

3. Architect will review the mockup to determine if the Work falls within acceptable ranges for color and texture variation, unevenness, appearance and workmanship. Final acceptance of colors and finish will be made from mockup samples.

4. Make corrections requested by the Architect, or remove and replace mockup when corrective work is not acceptable. Repeat mockup(s) until Architect's approval is obtained.

5. Protect approved mockup, which will be used as a standard for all remaining work on the Project, until its removal is authorized. Remove mockup only after completion and final acceptance of Suspended Drywall Grid System work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

1.07 WARRANTY

A. Suspensions System: Submit a written limited warranty executed by the manufacturer, agreeing to repair or replace grid components that are supplied with a hot-dipped galvanized coating or aluminum base material. Failures include, but are not limited to:
The occurrence of 50% red rust as defined by ASTM B 117 test procedures as a result of defects in materials or factory workmanship.

B. Warranty Period:
Grid: Ten years from date of installation.

C. The Warranty shall not deprive the District of other rights the District may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

Suspension Systems: Armstrong World Industries, Inc.

2.02 SUSPENSION SYSTEMS

A. Components:
    1. Main Beam: Shall be double-web construction (minimum 0.0179 inch prior to protective coating), hot dipped galvanized (per ASTM A653).
        a. HD8901: 1-1/2 inch web height, prefinished 15/16 inch flange with minimum G40 hot dipped galvanization
        b. HD8906: 1-11/16 inch web height, 1-1/2 inch flange, available with G40 or G90 hot dipped galvanization.
        c. HD8906F08: 1-11/16 inch web height with pre-cut facets (8 inches on center) for radius installations, 1-1/2 inch flange.
        d. HD8906F16: 1-11/16 inch web height with pre-cut facets (8 inches from ends, then 16 inches on center) for radius installations, 1-1/2 inch flange.
    2. Primary Cross Tees: Shall be double-web steel construction (minimum 0.0179 inch prior to protective coating), hot dipped galvanized (minimum G40 or G90 per ASTM A653), web height 1-1/2 inch with rectangular bulb and prefinished 1-1/2" knurled flange.
    3. Secondary Framing Cross Tees : Shall be double web steel construction (minimum 0.0179 inch prior to protective coating), hot dipped galvanized (minimum G40, web height 1-1/2 inch rectangular bulb and 15/16 inch flange (XL8341).
    4. Hat Furring Channel, HD8940: Shall be 48 inch x 1-3/8 inch x 7/8 inch, hot dipped galvanized steel (minimum G40 per ASTM A653); compatible with HD8901 and HD8906 main beams.
    5. Wall Molding:
        A. HD7859: Hot dipped galvanized (minimum G40), hemmed angle molding, 1-1/4 inch height with 1-1/4 inch flange.
        B. 7838: Hot dipped galvanized (minimum G40), unhemmed channel molding, ¾ inch x 1-9/16 inch x 1-1/4 inch flange.
    6. Clips:
        A. MBAC - Main Beam Adapter Clip
        B. DWACS, DW50, DW58 - Drywall Attachment Clip for transitions to acoustical ceilings
        C. Drywall Angle Clips - Available in 30 degree, 45 degree, 60 degree and 90 degree angles.
        D. XTAC - Cross Tee Adapter Clip
        E. Radius Clip (RC2)- Required to cover all pre-cut facets, including those not being clipped.
    7. Screws for wallboard application shall be bugle head screws in accordance with thickness of material used.

B. Structural Classification:
    1. Main Beam shall be heavy duty per ASTM C 635.
    2. Classification can require wires to be closer together for additional loading when used to support double layer gypsum, verticals, slopes, domes, half barrels, circles, soffits, canopies, and step conditions which call for loading or unusual designs and shapes in drywall construction. Using cross tees in the construction of circles, barrels, etc. is common in order to hold the radius.
    3. Deflection of fastening suspension system supporting light fixtures, ceiling grilles, access doors, verticals and horizontal loads shall have a maximum deflection of 1/360 of the span.

PART 3 - EXECUTION

3.01 INSTALLATION – GENERAL

A. Install suspension system and panels in accordance with the manufacturer's instructions, in compliance with ASTM installation standard, and with applicable codes as required by the authorities having jurisdiction.

B. The Armstrong Drywall Grid System can be installed in interior or exterior applications.

C. To secure to metal clips, concrete inserts, steel bar joist or steel deck, use power actuated fastener, or insert. Coordinate placement for hanger wire spaced as required for expected ceiling loads and layout.

D. Install hanger wire as required with necessary on center spacing to support expected ceiling load requirements, following local practices, codes and regulations. Provide additional wires at light fixtures, grilles, and access doors where necessary. A pigtail knot shall be used with three tight wraps at top and bottom fastening locations.

E. Add additional wire as needed when using compatible clips and accessories.

F. Control Joints: Roll formed zinc alloy, aluminum, or plastic as required for expansion and contraction as shown on drawings.

G. Expansion Joints: Roll formed zinc alloy, aluminum, or plastic as required for expansion and contraction as shown on drawings.

H. Main beams shall be suspended from the overhead construction with hanger wire, spaced as required for expected ceiling loads, along the length of the main beams.

I. Install cross tees at on center spacing as specified by the drywall manufacturer. Typical drywall cross tee spacing:
    1. 16 inches on center with 1/2 inch gypsum board
    2. 24 inches on center with 5/8 inch gypsum board

J. Other items such as wood, sheet metal, or plastic panels should be screwed to comply with deflection limit equivalent to that of the ceiling installation.

K. Use channel molding or angle molding to interface with Drywall Grid System to provide perimeter attachment or to obtain drop soffits, verticals, slopes, etc.

L. To suspend a second ceiling beneath a new or existing drywall ceiling, without breaching the integrity of the upper ceiling, use the Drywall Clip. To form a transition from a drywall ceiling to an acoustical ceiling, use the Drywall Transition Clips spaced as required for expected loads.

M. For light fixtures (Type G, Type F) use secondary framing cross tees as required to frame opening.

N. Single cross tees in a route hole to be secured by 7/16 inch framing screw or alternative methods.

3.02 INSTALLATION - EXTERIOR APPLICATIONS

A. Use vertical bracing as required by codes and standards in accordance with local jurisdiction (non-fire rated installations).

B. Install main beams as required according to Wind Uplift Design or local codes and standards.

C. Install cross tees as required according to Wind Uplift Design or local codes and standards, with additional tees when point loading (vertical), and with additional hanger at midspan of cross tee, as needed.

3.03 INSTALLATION - INTERIOR APPLICATIONS

A. Install main beams and cross tees at the on center spacing required for ceiling loading, and location of in-ceiling services.

B. Additional bracing as required by code.

3.04 INSTALLATION - RADIUS APPLICATIONS

A. Determine the bow or camber (Convex or Concave) in a main runner.

B. Establish a jig or pattern on a flat surface; mark locations to cut main beam; and use four pan head screws to fasten a Radius Clip (RC2) flat to the web between the bulb and the flange, per the manufacturer's instructions.

C. Install main beams with on center spacing and wire spacing, as needed, to support expected ceiling load.

D. Additional bracing may be required by code.

E. Install cross tees at on center spacing as specified by the manufacturer.

END OF SECTION

SECTION 09 2420

FURRING AND LATHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Metal furring and lathing for plastering work, complete with components and accessories as indicated on the Drawings, complete.

1.02 RELATED SECTIONS

A. Section 07 2500 – Weather/Air Barrier
B. Section 09 2423 - Portland Cement Plaster.

1.03 SUBMITTALS

A. Product Data: Provide data on furring and lathing components, structural characteristics, material limitations, and finish.

1.04 QUALITY ASSURANCE

A. Conformance: Provide furring and lathing in conformance with governing laws and regulations, and authorities having jurisdictions. Comply with FM "Approval Guide" for fire-rated assembly.

B. Allowable Tolerances: Do not exceed 1/8 inch in 8 ft for plumb alignment.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Framing:

1. Resilient channels shall be 25-gage (minimum) galvanized steel, 2-1/2 inch wide by 1/2-inch deep.

B. Diamond-Mesh Lath:

1. General: Expanded steel sheet conforming to ASTM A507, galvanized after fabrication. Nominal weight shall be 3.40 lbs. per square yard.

2. Flat Type: USG Diamond Mesh, Amico Small Diamond Mesh Lath, or acceptable equal.

3. Self-Furring: USG Self Furring Diamond Mesh Lath, Amico Self-Furring Diamond Mesh Lath, or acceptable equal.

4. Paper-Backing: Asphalt impregnated paper conforming to FS UU-B-790a, Type 1, Grade D, Style 2, factory-bonded to diamond-mesh lath.

C. Rib-Lath: USG 3/8" Riblath, Amico Rib Lath 3/8" (high), or acceptable equal weighing 3.40 lbs per square yard and galvanized after fabrication.

D. Wire Ties: ASTM A641.

E. Lath Attachment Devices: Devices of material and type required by referenced standards and recommended by lath manufacturer for secured attachment of lath to framing members.

F. Hangers and Bracing: Galvanized steel of type to suit application and rigidly support ceiling components in place, with minimum deflection.

2.02 ACCESSORIES

A. Galvanized Steel: Conforming to ASTM C847 and ML/SFA No. 12 standards, as manufactured by USG, Amico or acceptable equal unless indicated otherwise. Coordinate accessories with ground thickness requirements for plaster with Section 09220.

1. Corner Beads: USG No. 1A, Amico X-1, or acceptable equal with expanded flanges unless otherwise indicated.

2. Casing Beads: USG Square-edged No. 66, Amico X-66, or acceptable equal.

3. Internal Corner Strips: USG Cornerite, Amico Cornalath, or acceptable equal, with mitred corners.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions under which furring and lathing work is to be installed.

B. Do not proceed until unsatisfactory conditions detrimental to proper and timely completion of work have been corrected.

3.02 INSTALLATION

A. Furring:

1. Install metal furring in coordination with related work, in accordance with ASTM C841 and ML/SFA No. 12 furring standards.

B. Lathing:

1. Install metal lath in coordination with related work, in accordance with ASTM C841 and ML/SFA No. 12 lathing standards.

2. Apply metal lath taut, with long dimension perpendicular to supports, and secure at maximum 6 inches on centers. Lap end and side joints of lathing sheets 1-1/2 inches.

3. Continuously reinforce internal corners with corner strips, and exterior corners with corner beads as specified.

4. Establish locations of control joints in coordination with related work, for the proper application of contraction and expansion joint devices. Provide control joints at corners and every 20 ft interval, unless otherwise shown on the Drawings.

5. Set casing beads level, plumb and true to line, in the longest length practicable and align

joints with concealed splice or tie plate. Secure bead flanges with nails or with wire tying of flange-wing at maximum 8 inches on centers.

3.03 CLEANING

A. Upon completion, remove unused materials, containers and equipment, and clean floors of debris. Repair surfaces which have been marred or otherwise damaged by furring and lathing.

END OF SECTION

SECTION 09 2423

PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Exterior plastering work as scheduled and indicated on the Drawings, complete.

1.02 RELATED SECTIONS

A. Section 09 2420 - Furring and Lathing.

1.03 SUBMITTALS

A. Manufacturer's Data: Provide data on plaster materials, characteristics and limitations of products specified.

B. Samples: Provide 24” x 24” sample of steel trowel smooth finish and color for Architect’s approval.

1.04 QUALITY ASSURANCE

A. Manufacturer and Portland Cement Plaster contractor shall demonstrate a minimum of ten years of experience in the successful completion of projects utilizing similar systems, applications and performance requirements.

B. Manufacturer and wall systems contractor shall provide a list of five similar completed projects with addresses of the location, Architect and Owner.

C. Mockup:

1. Before beginning work, erect a mockup at a location on the site acceptable to the Architect to demonstrate proposed Portland Cement Plaster System and associated framing, sheathing, sheet waterproofing, flashing, sealants, and fasteners necessary to form the Portland Cement Plaster as shown on the drawings including construction, installation methods, coordination of the work specified in other relevant sections, accessories, features, color and texture.

2. The Architect will select mockup size and features, but in no case shall it be less than 4 feet long by 6 feet high.

a. Use same personnel, materials and construction techniques intended to be used for the Project.

b. Mockup shall including exposed reveals and expansion joints, which shall be reviewed with the Architect and shall be approved prior to fabrication on the mockup and in the final building location.

3. Architect will review the mockup to determine if the Work falls within acceptable ranges for color and texture variation, unevenness, appearance and workmanship. Final

acceptance of colors will be made from mockup samples.

4. Make corrections requested by the Architect, or remove and replace mockup when corrective work is not acceptable. Repeat mockup(s) until Architect's approval is obtained.

5. Protect approved mockup, which will be used as a standard for all remaining work on the Project, until its removal is authorized. Remove mockup only after completion and final acceptance of Portland Cement Plaster work.

F. Pre-installation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section “Quality Requirements”. Review methods and procedures related to Portland Cement Plaster System including, but not limited to, the following:

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, Portland Cement Plaster Installer, Portland Cement Plaster System manufacturer’s representative, and installers whose work interfaces with or affects Portland Cement Plaster System including installers of doors and window systems.

2. Review methods and procedures related to Portland Cement Plaster System installation, including manufacturer's written instructions.

3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.05 WARRANTY

A. System Warranty: Submit documentation on acrylic finish and primer standard warranties. At completion of work, provide written system warranty documentation.

B. Warranty Length: Six (6) years commencing at the time of substantial completion.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver manufactured materials in original unopened packages or containers, with manufacturer's label intact and legible.

B. Keep materials dry until ready to be used. Store off the ground and other damp surfaces, under waterproof covering or protection.

C. Remove wet or deteriorated materials from project site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement: ASTM C150, Type I or II portland cement.

B. Aggregate: Natural sand conforming to ASTM C897, with the following gradation:

Sieve Size	Percentage Retained

	Max.	Min.
No. 8	10	0
No. 16	40	10
No. 30	65	30
No. 50	90	70
No. 100	100	95

C. Hydrated Lime: ASTM C206, Type S.

D. Water: Potable, free from alkali and acid.

E. Waterproofing Admix: Red Label Suconem by Super Concrete Emulsions Ltd., AntiHydro, or equal.

F. Plaster Bonding Agent: "PlasterWeld", manufactured by Larsen Products Co., Jessup, MD, Upco Bonding Adhesive No. 705, or Merlex Stucco "Acrylex".

G. Base Coat Reinforcement: Alkali resistant fiberglass shorts, 1/2 inch chopped strands, Type AR, manufactured by OCF, PPG Industries, or equal.

H. Acrylic Finish Coat Plaster: Omegaflex 100% Acrylic based finish or equal.

a. Base coat: Omega Styroglue Drybond, Portland cement based, polymer modified base coat and adhesive.

b. Primer: Omega RapidPrime, 100% acrylic based primer.

c. Finish coat: Omega Omegaflex 100 % acrylic based finish, fine texture.

2.02 MIXES

A. Plaster Over Lath:

1. Scratch coat:

1 part portland cement
4-1/2 parts sand
1/4 part hydrated lime
1 lbs. of fiber per sack of cement

2. Brown coat:

1 part portland cement
3 parts sand
1/4 part hydrated lime
1 lbs. of fiber per sack of cement

3. Finish coat:

a. Acrylic Polymer-modified base coat: Mixed per manufacturers printed instructions.
b. Primer: Mixed per manufacturers printed instructions.

c. Acrylic Finish Coat: Mixed per manufacturers printed instructions.

d. Finish Coat to be: Integral Color – To Be Selected by Architect from manufacturer's standard colors.

B. Plaster Over Masonry:

1. Plaster Bonding Agent
2. Base Coat: Same as above brown coat.
3. Finish Coat: Same as above finish coat.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions under which plaster work is to be installed.

B. Do not proceed until unsatisfactory conditions detrimental to proper and timely completion of the work have been corrected.

3.02 INSTALLATION

A. General: Complete installation including smooth finish, with the Plastering Information Bureau, Jay R. Gorman, (818) 340-6767.

B. Over Lath:

1. Scratch coat: Apply scratch coat with sufficient material to completely cover lathing, to an approximate thickness of 3/8 inch. Cross-scratch plaster upon attaining its initial set and keep damp with fog-spray of water for not less than 48 hours after application.

2. Brown coat: Apply brown coat to an approximate thickness of 3/8 inch, or to a total thickness of 7/8 inch. Bring to a true even surface by floating or rodding, ready to receive the finish coat. Cure to a minimum of 72 hours, and allow to dry for at least 48 hours. Apply a woven fiber reinforced mesh, 4 1/2 oz.

3. Plaster finish coat: Apply base coat, primer and acrylic finish coat according to manufacturer's printed instructions. Apply 1/8 inch steel trowel smooth finish coat, color and smooth finish to match Architect's sample and bring the surface free of slick spots and other blemishes.

C. Over Masonry:

1. Bonding compound: After cleaning and preparing masonry surface of loose particles and deleterious substances, apply bonding compound in accordance with manufacturer's printed instructions.

2. Base Coat: Apply base coat to an approximate thickness of 3/8 inch, and bring to an even surface.

3. Finish Coat: Apply 1/8 inch of finishing coat and bring to a true even surface to a total thickness of 1/2 inch, color and a steel trowel smooth finish to match Architect's sample.

3.03 REPAIR

A. Work having cracks, blisters, pits, checks, or discoloration will not be accepted. Remove rejected work, and replace with new application of plaster.

B. Patching of defective work will be permitted only after review and approval of the Architect.

C. Perform cutting, patching, and pointing-up operations neatly and thoroughly. Point-up and finish surfaces around fixtures, outlet boxes, and other work flush with plaster.

D. Cut and patch wall surfaces which have been stained, marred or otherwise dented during plastering operation.

3.04 PROTECTION

A. Make provisions to eliminate spattering of plaster on floor and other surfaces. Remove plaster promptly from door frames, windows, masonry and other adjacent construction work.

3.05 CLEANING

A. Clean floors of debris, and leave broom clean upon completion of plastering work.

END OF SECTION

SECTION 09 2520

GYPSUM SHEATHING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Glass-mat gypsum sheathing board.

B. Related Requirements:

1.	07 2500	Weather/Air Barriers
2.	07 4213	Insulated Metal Panel System
3.	09 2216	Non-Structural Metal Framing
4.	09 2050	Furring and Metal Lath
5.	09 2423	Portland Cement Plaster

1.02 DEFINITIONS

A. Gypsum Board Construction Terminology Standard: Refer to ASTM C 11 for definitions of terms for gypsum sheathing board construction not defined in this Section or in other referenced standards.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

1.04 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For assembles with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory".

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store materials protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, or other causes. Stack sheathing flat on leveled supports off the ground, under cover, and fully protected from weather.

1.06 COORDINATION

A. Glass-Mat Gypsum Sheathing Board: Do not leave exposed to weather for more than 180 days.

PART 2 - PRODUCTS

2.01 GYPSUM SHEATHING

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.

1. Product: "Dens-Glass Gold" by G-P Gypsum Corporation or acceptable equal.

2. Type and Thickness: 1/2 inch thick.

2.02 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Glass-Mat Gypsum Sheathing Board:

1. Silicone Emulsion Sealant: ASTM C 834, compatible with sheathing tape and sheathing, recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

2. Glass-Fiber Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inches, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.

2.03 ACCESSORY MATERIALS

A. Fasteners: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. For steel framing less than 0.0329 inch thick, attach sheathing with steel drill screws complying with ASTM C 1002.

2. For steel framing from 0.033 to 0.112 inch thick, attach sheathing with drill screws complying with ASTM C 954.

PART 3 - EXECUTION

3.01 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and manufacturer's written instructions.

B. Cut boards at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

1. Install boards with a 3/8 inch setback where non-load-bearing construction abuts structural elements.

2. Install boards with a 1/4 inch setback where they abut masonry or similar materials that might retain moisture, to prevent wicking.

C. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.

D. Apply fasteners so screw heads bear tightly against face of sheathing boards but do not cut into facing.

E. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.

F. Vertical Installation: Install board vertical edges centered over flanges of steel studs. Abut ends and edges of each board with those of adjacent boards. Screw-attach boards at perimeter and within field of board to each steel stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.02 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written recommendations.

1. Apply elastomeric sealant on joints and fasteners and trowel flat. Apply sufficient quantity of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.

2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed sealant in entire face of tape. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION

SECTION 09 2900

GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Gypsum board, sheathing and tile backer systems and accessory.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 06 1000 – Rough Carpentry

3. Section 07 9200 - Joint Sealants.

4. Section 09 2216 - Non-Structural Metal Framing.

1.02 PROJECT REQUIREMENTS

A. Design Requirements: Provide systems capable of resisting deflection as required by CBC and authorities having jurisdiction.

B. Regulatory Requirements: Comply with CBC requirements for design and installation.

1.03 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating complete suspension system including connections, anchorage, and trim features.

B. Material Samples: Submit 18 inch by 18 inch Samples of the texture coat of gypsum board panels with edges taped.

C. Product Data: Submit manufacturer's catalog data for each product proposed for installation.

1.04 QUALITY ASSURANCE

A. Comply with following as a minimum requirement:

1. ASTM C474 - Standard Test Methods for Joint Treatment Materials for Gypsum Board Construction.

2. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

3. ASTM C514 – Standard Specification for Nails for the Application of Gypsum Board.

4. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board.

5. ASTM C919 – Standard Practice for Use of Sealants in Acoustical Applications.

6. ASTM C954 – Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 inch to 0.112 inch in Thickness.

7. ASTM C1002 – Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

8. ASTM C1047 – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

9. ASTM 1325 – Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.

10. ASTM C1396 – Standard Specification for Gypsum Board.

11. ASTM C1629 - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

12. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

13. ASTM D3274 - Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation.

14. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

15. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

16. ASTM E695 - Standard Method for Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading.

17. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

18. Underwriters Laboratories (ULI) requirements and listings for fire-rated materials and products classification.

19. GA 214 - Gypsum wallboard finish shall conform to requirements of GA 214, Application and Finishing of Gypsum Panel Products, published by the Gypsum Association, and as specified herein.

20. GA 600 - Gypsum wallboard shall conform to requirements of GA 600 Fire Resistance Design Manual, published by the Gypsum Association.

21. American National Standards for the Installation of Ceramic Tile.

22. ANSI A118.9 - Specification for Cementitious Backer Units.

B. Qualifications: Installer shall have a minimum 5 years experience in installing and finishing gypsum board.

C. CHPS Low-Emitting Materials table: Materials submitted must meet the CHPS Low-Emitting criteria and be listed as Low-Emitting on the following web site: www.CHPS.net.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, factory sealed packages, containers or bundles bearing brand name and name of manufacturer.

B. Materials shall be kept dry. Gypsum wallboard shall be neatly stacked flat; avoid sagging and damage to edges, ends, and surfaces.

C. Fire-rated materials shall have fire classifications numbers attached and legible.

D. Provide all means necessary to protect gypsum board systems before, during, and after installation.

E. Gypsum wallboard showing any evidence of water damage shall not be installed. Gypsum wallboard showing evidence of water damage after installation shall be removed and replaced.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Georgia-Pacific, National Gypsum Co., U.S. Gypsum Co., James Hardie, or equal.

2.02 MATERIALS

A. Gypsum Board Type X (fire-resistant): 5/8 inch thick, 4-foot wide and up to 16-foot long conforming to ASTM C1396 with long edges tapered.

GYPSUM BOARD SYSTEM			
Panel	**Fasteners**	**Joint Tape**	**Joint Treatment**
United States Gyp. Co.: 5/8 inch Sheetrock regular, type X, Firecode Core, or Firecode C Core Gypsum panels, as required by UL design.	Wood: 1 ¼-inch Type W drywall screws. Steel: 1 ¼-inch Type S or S-12 drywall screw.	Sheetrock paper tape Heavy Duty to meet ASTM C 475.	Sheetrock Setting Type, Lightweight Setting, Sheetrock Taping, Topping, or All-Purpose, Sheetrock Ready-Mixed Taping, Topping, or All-Purpose, or Sheetrock Lightweight All-Purpose or Ready-Mixed - Plus 3
Georgia-Pacific: 5/8 inch ToughRock regular, Fireguard or Fireguard C gypsum, as required by UL design.	Wood: 1 ¼-inch Type W drywall screws. Steel: 1 ¼-inch Type S or S-12 drywall screw.	Sheetrock paper tape Heavy Duty to meet ASTM C475.	Same as above

National Gypsum Co. 5/8 inch Gold Bond regular, Fire-Shield or Fire-Shield C gypsum wallboard, as required by UL design.	Wood: 1 ¼-inch Type W drywall screws. Steel: 1 ¼-inch Type S or S-12 drywall screw.	ProForm Joint Tape, ProForm Multi-Flex Tape Bead, ProForm Fiberglass Mesh Tape to meet ASTM C 475.	ProForm Multi-Use, ProForm All Purpose, ProForm Lite, ProForm Ultra, ProForm Taping, ProForm Triple-T, ProForm Topping, or ProForm Sta-Smooth, Sta-Smooth Lite, Sta-Smooth HS Joint Compound.

B. Impact Resistant Gypsum Board, Type X (fire-resistant): 5/8 inch thick, 4-foot wide and up to 16-foot long complying with one of the following:

1. Fire resistant rated gypsum core with additives to enhance impact resistance, faced with moisture and mold resistant paper, and complying with ASTM C1396.

2. Fire resistant, high density paperless gypsum with reinforcing fiber mesh.

3. Fire resistant fiberglass-mat faced gypsum board panels

GYPSUM BOARD IMPACT RESISTANT SYSTEMS			
Panel	**Fasteners**	**Joint. Tape**	**Joint Treatment**
United States Gyp. Co.: 5/8 inch Fiberock VHI Gypsum fiber panels.	Wood: 1 ¼-inch Type W drywall screws. Steel: 1 ¼-inch Type S-12 drywall screw.	Sheetrock paper tape Heavy Duty.	Sheetrock Setting compound.
Georgia-Pacific: 5/8 inch DensArmor Plus Impact Resistant Panels	Wood: 1 ¼-inch Type W drywall screws. Steel: 1 ¼-inch Type S-12 drywall screw.	Glass mesh.	Same as above.
National Gypsum Co.: 5/8 inch Hi-Impact XP gypsum wallboard.	Wood: 1 ¼-inch Type W drywall screws. Steel: 1 ¼-inch Type S-12 drywall screw.	ProForm joint tape	Proform XP all-purpose joint compound.

C. Tile Backer Board, Type X (fire-resistant):

1. Water resistant panels, 5/8 inch thick, 4-foot wide and up to 8-foot long conforming to conforming to one of the following requirements:

a. Aggregated Portland cement board with polymer-coated, woven glass-fiber mesh embedded in front and back surfaces.

b. Fiberglass-mat faced gypsum backing board complying with ASTM C1178.

c. Cementitious board surfaced with fiberglass reinforcing mesh on front and back and complying with ANSI A118.9 and ASTM C1325.

2. Tile backer boards shall meet the following requirements:

a. Resistance to Mold Growth: Minimum score of “10” when tested in accordance to ASTM D3273 and evaluated in accordance with ASTM D3274.

b. Resistance to Fungi: Maximum score of “0” when tested in accordance to ASTM G21.

TILE BACKER BOARD SYSTEMS			
Panel	**Fasteners**	**Joint. Tape**	**Joint Treatment**
United States Gyp. Co.: 5/8 inch DUROCK Cement Board.	Wood: 1 ½-inch galvanized roofing nails or 1 1/4-inch 1 5/8 inch, or 2 ¼-inch DUROCK No. 8 wood screws. Steel:1 1/4-inch or 1 5/8 inch DUROCK No. 8 screws.	DUROCK glassfiber tape.	ANSI A136.1 Type I: Organic adhesive or ANSI A118.1acrylic latex modified dry-set mortar or ANSI A118.4 Latex Portland cement mortar.
Georgia-Pacific: 5/8 inch DensShield Fireguard Tile Backer.	Wood: 1 ¾-inch galvanized roofing nails or 1 5/8 inch Buglehead corrosion resistant, course thread, drywall screws. Steel: 1 1/4-inch Buglehead, corrosion resistant, fine thread, drywall screws.	2-inch wide fiberglass mesh tape.	ANSI A136.1 Type I: Organic adhesive or ANSI A118.1 acrylic latex modified dry-set mortar or ANSI A118.4 Latex Portland cement mortar.
National Gypsum Co.: 5/8 inch PermaBase Brand Cement Board.	Wood: 1 ½-inch galvanized roofing nails or 1 1/4-inch or 1 5/8 inch, PermaBase corrosion resistant screws. Steel: 1 1/4-inch or 1 5/8 inch Type S-12 screws.	PermaBase mesh tape. 2-inch wide polymer-coated (alkali resistant) mesh tape for interior applications. 4-inch wide polymer coated (alkali resistant) mesh tape for exterior applications.	Treat joints and set facing material with latex-Portland cement mortar or dry-set (thin-set) mortar. Mortars shall comply with ANSI A118.1 or A118.4 standards. Type I organic adhesive meeting ANSI A-136.1 for interior use only.
James Hardie Building Products Inc.: ½ inch or ¼ inch Hardibacker 500 Cement Board (for floor and countertop application at existing schools only).	Wood: 1 ½-inch galvanized roofing nails. Wood and Steel: 1 1/4-inch No. 8 by 0.375 HD self drilling, corrosion resistant ribbed wafer head screws.	2-inch Wide High Strength. Coated, alkali-resistant, glass fiber reinforcing tape.	ANSI A136.1 Type I: Organic adhesive or ANSI A118.1acrylic latex modified dry-set mortar or ANSI A118.4 Latex Portland cement mortar.

2.03 ACCESSORIES

A. Metal Trim: Paper-faced metal drywall beads and trim meeting ASTM C1047, as manufactured by USG/Beadex, National Gypsum, or equal. Trim units shall be of size and type to fit gypsum board construction and shall include corner beads, casings, edge trim and other shapes indicated and required.

B. Mold Resistant Joint Compound: As recommended by board manufacturer, OnePass by CTS Cement Manufacturing Co., or equal, meeting the following requirements:

1. Minimum score of “10” when tested in accordance with ASTM D3273 and evaluated in accordance with ASTM D3274.

2. Shall conform to ASTM C475.

C. Joint Tapes: Shall conform to ASTM C475.

D. Finishing Materials:

1. High solids primer shall be SHEETROCK Brand First Coat manufactured by USG or High-build primer by Sherwin Williams, or equal.

2. Texture coat finish material shall be manufactured by U.S. Gypsum, Hamilton, or Highland Stucco and Lime Products, Inc., or equal.

E. Acoustical Sealant: Non-hardening, non-shrinking, for use in conjunction with gypsum board, as recommended by Board Manufacturer and conforming to ASTM C919.

F. Fasteners:

1. Self-drilling, self-tapping bugle-head drywall screws; in conformance to ASTM C1002. No. 6 Type S or S12, 1 ¼--inch long for metal framing,

2. Wood framing:

a. Nails: Hot dip, 0.016 inch diameter galvanized nails with 7/16 inch head and 1 ¼-inch minimum length.

b. Screws: Type W 1 ¼-inch minimum length for single-layer panels. Screws shall be furnished with a corrosion-resistant treatment.

3. Adhesive: as recommended by board manufacturer and in compliance to ASTM C557.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Metal Trim:

1. Provide corner beads at outside corners and angles, metal casing where gypsum board terminates at uncased openings, metal edge trim where board edges abut horizontal and vertical surfaces of other construction.

2. Install trim in accordance with manufacturer's directions with appropriate joint compound. Install trim in longest practical pieces.

B. Gypsum Board:

1. Install gypsum board in conformance with ASTM C840.

2. Gypsum board shall be cut by scoring and breaking or by sawing, working from face side. Where board meets projecting surfaces it shall be scribed and neatly cut. Unless conditions require otherwise, gypsum board shall be installed first to ceilings, then to walls. End joints shall occur over a support. Install panels of maximum practical length so a minimum number of end joints occur.

3. End joints shall be staggered and joints on opposite sides of a partition shall be arranged to occur on different studs. Joint layout at openings shall be installed so no end joints will align with edges of openings.

4. Except where specified otherwise, fasteners shall be spaced not less than 3/8 inch from edges and ends of gypsum board. Do not stagger fasteners at adjoining edges and ends.

5. Install gypsum board vertically or horizontal as permitted by specific UL Design at walls. Fasten board with drywall screws spaced not to exceed 8 inches on centers around perimeter of boards and 8 inches on centers on intermediate studs. Space screws at 8 inches on centers along top and bottom runners. Screws shall be driven to provide screwhead penetration just below gypsum board surface without breaking surface paper. Where electrical outlet and switch boxes are indicated, provide adjustable attachment brackets between studs.

6. Install gypsum board to ceiling framing with long dimension at right angles to furring channels, or wood framing members, and fasten with specified drywall screws or nails spaced 6 inches to 7 inches on centers across board. Screws or nails shall be not less than 1/2 inch from side joints and 3/8 inch from butt end joints. Abutting end joints shall occur over furring channels and end joints of boards shall be staggered. Support cutouts or openings in ceilings with furring channels.

7. Install access doors, furnished under another section, in correct location, plumb, or level, flush with adjacent construction, and securely fastened to framing.

3.02 TOLERANCES

A. Install gypsum board flat within 1/8 inch in 10 feet.

3.03 JOINT TREATMENT AND FINISHING

Level	Joints	Interior Angles	Accessories	Fasteners	Surface
1	Tape set in compound	Tape set in joint compound			Tool marks and ridges acceptable
2	Tape set in joint compound and one separate coat of joint compound	Tape embedded in joint compound and wiped to leave a thin coat of compound over tape, and one separate coat	Covered by one separate coat of joint compound	Covered by one separate coat of joint compound	Free from excess joint compound. Tool marks and ridges acceptable.
3	After taping, cover with two separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 2 separate coats of joint compound	Smooth and free of tool marks and ridges *
4	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Smooth and free of tool marks and ridges *

Level	Joints	Interior Angles	Accessories	Fasteners	Surface
5	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Skim coat of joint compound applied to entire surface. Surface free from tool marks and ridges. *

*At completion of specified taping and finishing, install one coat of high solids primer as specified hereafter

B. Levels: Install tape bedding compound, tape, and finishing cement on joints in wallboard as required for specified levels of finish.

C. Levels 2 through 5:

1. Install joint cement and finishing cement over screw heads. Treat all inside corners with joint cement, tape, and finishing cement. Treat outside corners with corner beads and finishing cement.

2. Provide metal casing beads at all edges of gypsum wallboard, which abut ceiling, wall, or column finish, and elsewhere as required, such as openings, offsets, etc. Install all exposed joints, trims, and attachments non-apparent following installation of paint or other finishes. If joints and fasteners are visibly apparent, correct defects as required.

3. Seal raw edges of plumbing openings and boards that have been cut to fit with sealing compound brushed on.

4. When entire installation is completed, correct and repair broken, dented, scratched or damaged wallboard before installation of finish materials by other trades.

D. Levels 3 and 4: Install one coat of high solids primer over entire surface.

E. Level 5: Install one coat of skim coat over entire surface, followed by one coat of high solids primer over entire surface.

3.04 REQUIRED LEVELS OF FINISH

A. Unless otherwise indicated or specified, levels of finish required shall be as follows:

1. Level 1: Plenum areas above ceilings, insides of shafts, and other concealed areas. Taping to be as required for fire rated assemblies.

2. Level 2: Water-resistant wallboard backing for high moisture areas to be covered with a water resistant surface other than tile, vinyl or paint, i.e stainless steel cladding etc.

3. Level 3: Backing for vinyl wall covering and adhered acoustic tile. Also, provide where textured finish is indicated.

4. Level 4: Exposed painted wallboard in utility rooms, storage rooms and similar spaces not requiring Level 5 finish.

5. Level 5: Exposed, painted wallboard in multipurpose rooms, offices, corridors, and similar public spaces.

3.05 TEXTURE COAT

A. Spray install texture coat to interior gypsum board surfaces where indicated on Drawings.

B. Texture coat shall provide a uniform splatter pattern finish with an 80 percent minimum coverage of surface.

C. Provide protection from spray for interior surfaces of electrical boxes and wiring.

3.06 CLEAN-UP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.07 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 3013

CERAMIC TILE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Ceramic tile.

2. Cementitious backer units installed as part of tile installations.

3. Mortar setting beds for wall tile.

4. Epoxy grout for wall tile.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 07 9200 - Joint Sealants

3. Section 09 2900 - Gypsum Board.

1.02 SUBMITTALS

A. Product Data: Manufacturer's data, standard specifications, Material Safety Data Sheets, and other technical information for each product specified.

B. Material Samples: Manufacturer’s standard palette, indicating full range of tile colors, textures, and grout colors.

C. Mock-Ups: For each type, color, and texture, minimum one foot square or three full tile courses, on Plexiglas to demonstrate proper bond mortar and coverage; grout color, hardness and depth.

D. Installation Instructions: Manufacturer's preparation and installation instructions.

E. Product Certificates: Signed by manufacturer certifying that products furnished comply with requirements of this Specification.

1.03 QUALITY ASSURANCE

A. Comply with applicable parts of the following codes or standards as a minimum requirement:

1. ANSI A108, American National Standard Specifications for the Installation of Ceramic Tile.

2. ANSI A118, American National Standard Specifications for Ceramic Tile Installation Materials.

3. ANSI A136.1, Standard Specifications for Ceramic Tile.

4. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

5. ASTM C185 - Standard Test Method for Air Content of Hydraulic Cement Mortar.

6. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.

7. ASTM C150 - Standard Specification for Portland Cement.

8. ASTM C241 - Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.

9. ASTM C206 - Standard Specification for Finishing Hydrated Lime

10. ASTM C503 - Standard Specification for Marble Dimension Stone.

11. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.

12. ASTM D4551 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Flexible Concealed Water-Containment Membrane.

13. Tile Council of North America (TCNA) – Current edition of "Handbook for Ceramic Tile installation".

B. Grade Certificate and Labeling: With each delivery of tile, furnish manufacturer's "Master Grade Certificate" to the Project Inspector.

C. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.

D. Consistent Quality: Products shall be consistent in appearance and physical properties.

E. Comply with requirements of California Building Code and ADAAG.

F. Qualifications of Tile Manufacturer: Company specializing in ceramic tile, mosaics, pavers, trim units, and thresholds with five years minimum experience.

G. Qualification of Installation System Manufacturer: Company specializing in installation systems/ mortars, grouts/ adhesives with ten years minimum experience.

H. Qualifications of Installer: Company specializing in installation of ceramic tile, mosaics, pavers, trim units and thresholds with five years experience with installations of similar scope, materials, and design.

I. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 01 3119 – Project Meetings. Review methods and procedures related to epoxy coating including, but not limited to, the following:

1. Inspect and discuss installation procedures, jobsite conditions, substrate specification and coordination with other trades.

2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.

3. Review special tile designs and patterns.

4. Review dust control procedures.

J. Comply with manufacturer's specifications and design guide and with written recommendations for ceramic tile type indicated unless more stringent requirements are specified.

K. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups for ceramic / porcelain tile including accessories. Size: Minimum 25 sq. ft. of typical wall / floor tile condition for each color and pattern in locations directed by District's / Architect's Representative.

2. Approved mockups may become part of the completed Work if undistributed at time of Substantial Completion.

3. Before beginning work, erect a mockup at a location on the site acceptable to the District's / Architect's Representative to demonstrate proposed ceramic / porcelain tile work and associated work necessary to form the ceramic / porcelain wall and floor tile work as shown on the drawings including construction, installation methods, coordination of the work specified in other relevant sections, accessories, features, color and texture.

4. The District's / Architect's Representative will select mockup size and features, but in no case shall it be less than 5 feet long by 5 feet wide. Use same personnel, materials and construction techniques intended to be used for the Project.

5. District's / Architect's Representative will review the mockup to determine if the Work falls within acceptable ranges for color and texture variation, unevenness, appearance and workmanship. Final acceptance of colors will be made from mockup samples.

6. Make corrections requested by the District's / Architect's Representative, or remove and replace mockup when corrective work is not acceptable. Repeat mockup(s) until District's / Architect's Representative's approval is obtained.

7. Protect approved mockup, which will be used as a standard for all remaining work on the Project, until its removal is authorized. Remove mockup only after completion and final acceptance of ceramic tile work.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver tile and other materials in sealed containers, with manufacturer's labels intact.

B. Keep all materials clean and dry.

1.05 MAINTENANCE

A. Extra Materials: Provide a minimum of five percent of each type and color as the installed tile, in manufacturers' cartons and labeled.

1.06 WARRANTY

A. Manufacturer shall provide a five year material warranty.

B. Installer shall provide a five year fabrication and installation warranty.

C. For waterproofing, manufacturer shall provide a 10 year material warranty for waterproofing installation, tile setting, and grouting materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Tile: To establish quality, Specification is based on ANSI A137.1 Standard Grade. Equivalent tile products from the following manufacturers may be provided:

1. Dal-Tile Corporation

2. Mosa Tile

3. American Olean

B. Installation Materials: To establish quality for setting and waterproofing materials, Specification is based on ANSI A137.1. Products and methods of the following manufacturers may be provided:

1. Laticrete International, Inc.

2. Custom Building Products.

3. Mapei.

4. Equal.

2.02 MATERIALS

A. Floor tile

1. Daltile Keystones

a. Size: 2x2 mosaic

b. Thickness:1/4 inches

c. Finish: Matte

A. Glazed Ceramic Wall Tile:

1. Mosa Tile

a. Size: As indicated on drawings
b. Thickness: 5/16 inches
c. Finish: Semi-gloss

B. Cementitious Tile Adhesives:

1. Thin set mortar over substrates prepared accordingly:

a. Custom Building Products VersaBond Flex® Fortified Thin-Set Mortar. With Shear Bond Strengths greater than 350 psi, per ANSI A118.4 Section 5.2.4 as basis of design.

C. Tile Grout:

1. Epoxy Grout:

a. Custom Building Products CEG-Lite™100 % Solids Commercial Epoxy Grout as basis of design..

P. Cleaner and Sealer:

1. Cleaner: Aqua Mix Concentrated Tile Cleaner, neutral phosphate-free cleaner, or Custom Building Products Tile Lab Concentrated Tile and Stone Cleaner.

2. Sealer: Aqua Mix Penetrating Sealer, fungus- and bacteria-resistant, stain-resistant, and slip-resistant as specified for tile, Custom Building Products Tile Lab Surface Gard, or equal.

Q. Sealants:

1. Sealant and primer shall be from one manufacturer, acceptable to tile and grout manufacturers. See Section 07 9200 - Joint Sealants.

2. Ceramic Tile: One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

2.03 Trim:

1. Straight Profile: Schluter – JOLLY stainless steel 304, straight edge profile at external corners, where tile projects from jamb, and side and top terminations of tile.

2. Cove Profile: Schluter – DILEX stainless steel profile where wall tile meets the floor. Provide inside and outside corner pieces, end caps, and connectors as needed.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Examine substrates and conditions for compliance with installation requirements. Verify that all penetrations through substrate have been installed. Proceed with Work only after all conditions are in compliance.

B. Substrates shall be firm; dry; clean and within flatness tolerances required by relevant ANSI A108 tile installation standards. Prepare surfaces as follows:

C. Substrates to receive wall tile and base shall be:

1. Cementitious backing panels, as specified in Section 09 2900 - Gypsum Board.

D. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical items of Work, and similar items located in or behind tile has been completed before installing tile.

E. Verify that joints and cracks in tile substrates are coordinated with caulked-joint locations; if not coordinated, adjust as required by the Architect.

F. Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are maintained in compliance with referenced standards and manufacturer's written instructions.

G. Protect adjacent surfaces during progress of Work of this section.

3.02 TILE INSTALLATION, GENERAL

A. Install tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Center the tile fields in both directions for each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

B. For tile mounted in sheets: Joints between tile sheets shall be the same width as joints within tile sheets.

C. Extend Work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without damaging tile. Carefully grind the cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Locate joints, directly above joints in concrete substrates, at horizontal and vertical changes in plane, or where indicated during installation of mortar beds. Do not saw-cut joints after installing tiles.

F. Prepare and clean joints to be sealed. Apply sealants to comply with requirements of Section 07 9200 - Joint Sealants.

G. Conform to manufacturers printed instructions, and applicable requirements of ANSI and TCNA Standards.

3.03 TILE INSTALLATION, WALLS

A. Install tile over cementitious backing panels utilizing "thin-set" method with thinset mortar, in accordance with manufacturer's printed instructions and ANSI A108.5. Confirm substrate is completely clean and free of dust. Insure that bond coats do not intrude into joints to be caulked.

B. Minimum coverage of bond mortar shall be 80%.

C. Lay out Work so tiles will be centered on each wall or section of wall in order to minimize tile cuts. Lay out tile wainscots to next full tile beyond dimensions indicated. Spot setting bed with mortared tile, set plumb and true, accurately indicate plane of finished tile surfaces.

D. Install tile on walls with following joint widths:

1. Ceramic Tile: 1/16.

E. Horizontal joints shall be level, vertical joints plumb with surfaces true and plumb, edges of tiles flushed.

F. Rub exposed cuts smooth with a fine stone; no cut edge shall be set against a fixture or adjoining surface without a 1/16 inch joint to be caulked.

G. Install access doors where required, furnished under another section, in correct location, plumb or level, flush with adjacent construction, and securely fastened to framing.

3.04 TRIM PROFILE INSTALLATION

A. Install trim profiles in accordance with manufacturer's installation instructions.

B. Miter straight profile at corners.

C. Provide end caps at end terminations of cove profiles. Provide inside corner and outside corner pieces and connectors as needed to produce a continuous cove profile.

3.05 GROUTING

A. Prior to starting, ensure that all tile surfaces are clean and excessive bond mortar is scraped and vacuumed from joints (approximately 2/3 depth of tile should be open for grouting). Follow manufacturer's instructions for mixing grout. Once grout Work commences, proceed until complete wall or floor area is finished utilizing one batch of grout.

B. Epoxy grouting: Do not dampen tile. Follow manufacturer's instructions for mixing grout. Force grout into joints with sufficient pressure on rubber float so as to fill joints completely, and scrape excess grout off tile surface with rubber float. Smooth or tool grout to uniform joint finish. Do not allow grout to harden on face of tile.

E. Curing epoxy grout: Do not cover for 72 hours. Then, if grout is not tacky, cover with 40-weight Kraft paper for protection.

3.06 CLEANING AND SEALING

A. If grout scum is not visible on tile surface after curing, clean tile surface with clear water. Remove and replace cracked, broken or defective Work with proper material.

B. If, when curing membrane is removed, grout scum is visible on tile surface, use the following cleaning method:

1. Utilize a neutral cleaner acceptable to manufacturers of tile and grout, and follow manufacturer's instruction. Do not provide generic acid cleaners.

3. Wet tile and apply cleaning solution to surface, then scrub with a brush. Rinse area several times with clean water to flush solution off floor surface.

C. Apply penetrating sealer in accordance with manufacturer's instructions utilizing a dense sponge applicator, paint pad, sprayer or brush. Avoid overlapping, puddling, and rundown. Completely wipe surface dry within 3 to 5 minutes using cotton or paper towels; do not allow sealer to dry on tile. After two hours, test surface by applying water droplets to surface. If water is absorbed, apply a second coat. Avoid surface traffic for 24 hours.

3.07 SEALANTS

A. Insure joints to be sealed are free of setting and grouting materials and construction debris. Do not permit any foot traffic on installed sealants for a minimum of 48 hours or protect with hardboard strips.

B. Install in accordance with Section 07 9200 - Joint Sealants.

3.08 PROTECTION

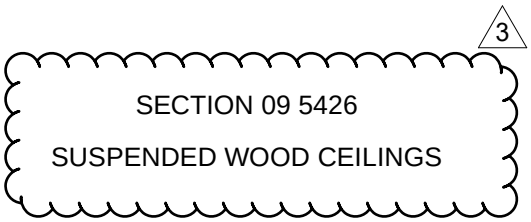
A. Admit no traffic where tile is installed until mortar and grout has set for a minimum of 72 hours.

B. Protect Work of this section until Substantial Completion.

3.09 CLEAN UP

A. Remove rubbish, debris, and waste material and legally dispose of off the Project site.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

A. Panel Grille Ceiling and Wood Wall Panels

1.02 RELATED SECTIONS

A. None

1.03 REFERENCES

A. ASTM E 84 - Title; 2001.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

A. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1:360.

B. Wood is a natural product that will undergo changes with variations in the environment. Therefore, all dimensional tolerances are plus or minus 1/8 inch (3 mm).

C. Suspended Wood Ceiling and Wood Wall Panels meet seismic code compliance using a direct screw attachment to steel channel or structure, per details. Local code requirements should be consulted to determine additional requirements.

D. Fire Performance Characteristics: Suspended Wood Ceiling and Wood Walls shall conform to Class 1, or A flame spread rating, tested according to ASTM E 84; Flame Spread: 25 or less. Smoke Developed: 450 or less.

1.05 SUBMITTALS

A. Submit under provisions of Division 01 - Section 01 33 00

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

C. Shop Drawings: Provide layout of suspended Wood Ceiling and Wood Walls, coordinated with other trades that will penetrate the wood ceiling or interfere with the installation and recessed or surface mounted devices located within the ceiling and wood wall panels. Indicate method of suspension where interference exists.

D. Verification Samples: For each finish product specified, one samples, minimum size 12 inches (305 mm) square, representing actual product, color, and patterns.

E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

F. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment and periodic cleaning and maintenance of all components.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Minimum 2 years documented experience installing projects of similar size and complexity.

C. Provide seismic design of suspended ceiling under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

D. Pre-Installation Conference: Convene minimum two weeks prior to starting work of this section. Agenda shall include project conditions, coordination with work of other trades, and layout of items that penetrate ceilings.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver material in the manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store products off the floor in manufacturer's unopened packaging protected from exposure to harmful environmental conditions and at temperature and humidity conditions as recommended by the manufacturer.

C. A minimum of 72 hours prior to ceiling installation, suspended wood ceilings shall be stored in the room in which they will be installed. Temperature and humidity of the room during this period shall closely approximate those conditions that will exist when the building is occupied.

D. Handle materials to avoid damage.

1.08 SEQUENCING

A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.09 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Plenums have proper ventilation, especially in high moisture areas with no excessive buildup of heat in the ceiling areas.

C. Space shall be fully enclosed with all exterior windows and doors in place, glazed, and weather-stripped. Roof is to be watertight, and all wet trades' work is to be completed, and thoroughly dry.

D. Mechanical, electrical, and other utility services above the ceiling plane shall be completed. No materials should rest against, or wrap around, the ceiling suspension components or connecting hangers.

E. Install only when the temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. Heating and cooling systems shall be operating before, during, and after installation, with the humidity of the interior spaces maintained between 25 and 55 percent, and a temperature between 60 to 90 degrees F.

1.10 COORDINATION

A. Coordinate layout and installation of the wood slats ceiling systems with other work penetrating the ceiling including light fixtures, HVAC equipment, and fire suppression system components.

1.11 EXTRA MATERIALS

A. See Section 01 60 00 - Product Requirements.

B. Deliver materials for Owner's use in maintenance.

1. Provide 2 percent of each type actually installed for use by owner in building maintenance and repair.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Rulon International, which is located at: 2000 Ring Way Rd.; St Augustine, FL 32092; Toll Free Tel: 800-227-8566; Tel: 904-584-1400; Fax: 904-584-1499; Contact Information: jmcmanus@rulonco.com - (303) 915-4500

B. Substitutions: Not permitted.

2.02 MATERIALS - GENERAL

A. Wood is a natural product that will undergo changes with variations in the environment. Therefore, all dimensional tolerances are plus or minus 1/8 inch (3 mm).

2.03 PANEL GRILLE CEILING PANELS (PG-1)

A. General: Standard Panel Grilles are 1 foot (305 mm) wide and in nominal lengths of 2 feet (610 mm) to 10 feet (3048 mm) in 1 inch (305 mm) increments. Actual lengths are 1 inch (25 mm) shorter to allow for a reveal between panels. Wood strips are fabricated without finger-joints and fastened together with black dowels and flexible black ABS backer for direct attachment. Dowels and ABS backers are positioned 5-1/2 inches (140 mm) from the ends and 12 inches (305 mm) on center, with interconnecting male-to-female dowel attachment.

1. Profile: PG 6-12-37 (FD)

a. Number of Blades per foot: 6

b. Blade Thickness: 3-1/4”

c. Depth of the Blades: 2-5/16”

2. Panel Design Description:

a. Flexible Panel Grilles

1) Grilles consist of individual wood strips assembled in 12 inch widths in lengths up to 10 feet. Wood strips are drilled 12 inches on center, beginning 5-1/2 inch from each end. Flexible black ABS are attached to the back of grilles 12 inches on center, beginning 5-1/2 inch from each end. Dowels and black ABS are positioned perpendicular to the wood strips. Panel Grilles are 1 inch under an even foot length. Dowels and flexible black ABS to be furnished black to be hidden from view.

3. Trim and Border Treatment: Provide end caps or junction trims as indicated on the Drawings in the same species and finish as the Panel Grille.

4. Wood Species:

a. Solid White Maple

5. Finish:

a. Satin Clear

2.04 FABRICATION

A. Edges, borders, and perimeter trims shall be indicated on the Drawings in accordance with the manufacturer's standard design details. All suspended wood ceiling products specified shall be supplied by the wood slat ceiling manufacturer.

2.05 PANEL GRILLE WOOD WALL PANELS: (PG-2)

A.

1. Profile: PG 6-12-37 (DW)

a. Number of Blades per foot: 6

b. Blade Thickness: 3-1/4”

c. Depth of the Blades: 2-5/16”

2. Panel Design Description:

a. Doweled and Wood-Backed Panel Grilles

1) Grilles consist of individual wood strips assembled in 12 inch widths in lengths up to 10 feet. Wood strips are drilled 12 inches on center, beginning 5-1/2 inch from each end. Black wood-backers are attached to the back of grilles 12 inches on center for direct attachment, beginning 5-1/2 inch from each end. Dowels and black wood-backers are positioned perpendicular to the wood strips. Panel Grilles are 1 inch under an even foot length. Dowels and wood-backers to be furnished black to be hidden from view.

3. Trim and Border Treatment: Provide end caps or junction trims as indicated on the Drawings in the same species and finish as the Panel Grille.

4. Wood Species:

a. Solid White Maple

5. Finish:

a. Satin Clear

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that the steel channel specified in Section 09 22 26 - Suspension Systems are in place, suspended and leveled in a direction perpendicular to the wooden strip direction of the wood panels.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Work shall not begin until the space is fully enclosed and glazed and all wet work is completed and dried out to the satisfaction manufacturer.

C. Temperature shall be at least 65 degrees Fahrenheit during the installation and thereafter.

D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction, including the following:

1. Comply with ASTM C 636 and seismic design requirements indicated.

2. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

3. Additional Hanger Wires: Wrapped tightly 3 full turns to structure and component at locations where imposed loads could cause deflection exceeding 1/360 span or tolerances specified below.

4. Wall units shall be direct attached to wood furring strips or wall structure (not by Rulon).

B. Use a laser leveling device to lay out and install the perimeter trim as specified.

C. Suspend panels from the system as indicated.

D. Make final adjustments to level or contours as required.

3.04 FIELD QUALITY CONTROL

A. Technical Service: Manufacturer shall provide a local Technical Service Representative for on-site training and assistance during the installation process.

B. Environmental Monitoring: Manufacturer shall provide a temperature and humidity sensor to actively monitor the room in which the wood slats shall be installed for a minimum of one week before and up to two weeks after installation has been completed including all of the weeks in between.

C. Upon completion of ceiling installation, the owner's representative shall inspect all finished surfaces to ensure that the work has been completed in a manner satisfactory to the owner. Any deficiencies in the install of the ceiling shall be corrected prior to substantial completion.

3.05 ADJUSTMENTS AND CLEANING

A. Clean exposed surfaces of ceiling panel in accordance with manufacturer's instructions.

B. Remove and replace panels and tiles, which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 6456

RESILIENT STAGE FLOOR

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Furnishing and installing a new stage floor as specified and as indicated on Drawings for the auditorium stage.

B. Installation work includes, but is not limited to the following:

1. Verification of dimensions and conditions at the job site.

2. Installation of new sheet vapor retardant on substrate surface, neoprene pads, shimmed sleepers, plywood sub-flooring, finish flooring, door sills, wall base, and apron edge nosings in accordance with these Specifications, related Drawings, established trade criteria, and all applicable code requirements.

C. Related work:

1. The above scope of work is intended as a reference guide only and is not intended to define the limits of the work necessary for a complete installation. All labor, materials, and equipment necessary for the proper operation of all systems must be provided.

D. Bids must include:

1. All equipment specified or indicated in the ‘Products’ section and in the related drawing documents, including all the necessary hardware, fittings, and components necessary for a complete and functional stage floor.

2. Schedule and time estimate for preparation, fabrication, equipment delivery, and installation.

1.02 SUBMITTALS

A. Make submittals in accordance with Section 013300.

1. Submit product data for moisture barrier, resilient blocks, insulation, floor materials, and floor coating.

2. Submit a 1’-0” x 1’-0” sample of flooring including proposed assembly of subflooring, resilient neoprene pads, edge blocking on one side, and floor finish color on surface.

1.03 QUALITY ASSURANCE

A. The entire stage floor shall be installed by a single Contractor including moisture barrier, flooring, anchorage system, acoustical batting, sub-flooring, resilient mounts, trim, sleepers, expansion provisions, and finish.

B. All flooring must be obtained from a single manufacturer or source to ensure the match of color, texture, pattern, and quality.

C. The contractor shall be specialized in the installation of resilient flooring with not less than 5 years of experience in the installation of stage flooring.

1.04 WARRANTY

A. Contractor shall provide Owner with copies of a 3-year warranty for finished wood flooring and associated work. This warranty shall agree to repair or replace flooring that shrinks, warps, cracks, or otherwise deteriorates excessively, or that buckles, delaminates, or breaks its anchorage or bond with substrate or otherwise fails to perform as required or as represented by the manufacturer due to failures of materials and workmanship. Warranty shall be signed by the Contractor who shall assume the responsibility for obtaining warranties on materials from manufacturers.

PART 2 - PRODUCTS

2.01 FINISH PANEL FLOORING

A. Hardboard, 1/4” thick, tempered both sides.

2.02 SUB-FLOORING

A. Two layers of A-C Douglas Fir plywood, exterior glue, 3/4 inch thick.

2.03 SLEEPERS

A. Douglas Fir 2x4s. Kiln-dried to 15% maximum moisture content. Discard bowed or twisted pieces.

2.04 CUSHION BLOCKS

A. 3/4” thick neoprene resilient pads, hardness of 45-50 durometer.

2.05 ACCESSORIES

A. Sheet Vapor Retardant: 6 mil thick black polyethylene, with 2 inch wide self adhesive, reinforced tape for lap joint sealing.

B. Wall Base: Vinyl, 4 inch high with a 3 inch toe, ventilating type, with attachment accessories, pre-fabricated corner intersections, black color.

C. Insulation: Provide semi-rigid glass fiber insulation panels, 1-1/2 inch thick, unfaced.

2.06 FINISHING

A. Floor Paint: ICI Sinclair Dulux Pro Flat Black 100% Pure Acrylic #22009990.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE, HANDLING, AND PREPARATION

A. Protect wood flooring from excessive moisture in shipment, storage, and handling. Deliver in unopened packaging fully identified to show type, brand, grade, and quality.

B. Place wood flooring materials in space to be floored at least 7 days in advance of start of installation. Open packages of wood flooring that are sealed to permit natural adjustment of moisture content.

C. Maintain minimum room temperature 65 degrees F, maximum 78 degrees F, for a period of 2 days prior to delivery of materials, during, and after installation.

D. Verify that recessed subfloor surface is smooth and flat to a tolerance of 1/16 inch per 10 feet.

E. Verify that concrete substrate moisture content is 8 percent maximum.

F. Do not install wood flooring until wet construction work is completed and building is completely weatherproofed.

G. Broom clean substrate.

3.02 INSTALLATION

A. General:

1. Comply with flooring manufacturer's recommendations and approved submittals. Maintain 1-1/4"inch clear separation at all perimeters and penetrations.

2. Install moisture barrier wherever flooring will be installed on concrete.

3. Provide positive captive shims or approved leveling compound under sleepers as necessary to bring top of sleepers to required level to within 1/16 inch in 10 feet. Maximum plus or minus 1/16 inch over the entire floor.

4. Provide neoprene pads for optimum floor resiliency. Space nominally 16 inches on center in upstage to downstage direction and 16 inches on center in onstage to offstage direction. Ensure that pads rest on wood sleepers before attachment. Attach neoprene pads to lower side of sleeper using epoxy cement.

5. Place sleepers around the perimeter of the stage. Place balance of the sleepers in parallel rows on 16" centers across the stage area. Lay sleepers in upstage/downstage direction.

6. Attach plywood subfloor layers to the sleepers with flat head wood screws on 16" centers leaving 1/4" space at plywood joints. Lap seams between layers 16" in both directions.

7. Apply tempered hardboard flooring with flat head wood screws on 12" centers around perimeter only of each 4' x 8' sheet, and on 16” centers in the field of each sheet. Countersink all screw heads. Leave 3/32" space at all joints. Use no adhesives. Lay 8-foot panels in a stage left to stage right pattern.

8. FINISHING

B. Allow installed stage floor to acclimate to ambient conditions for a minimum period of 10 days before finishing.

C. Apply two coats of pure acrylic paint. Finish is to be flat black.

D. Apply a 2” white contrasting stripe along the stage edge.

E. Do not apply plastic coatings of any type. Final finish shall be dark and low luster.

3.03 COMPLETION

A. Install base and shoe moldings.

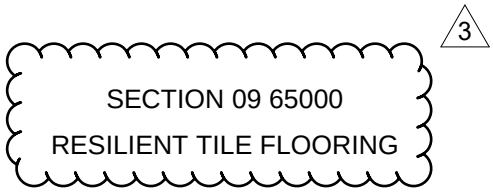
B. Install extruded, mill finished 1/4 inch thick by width and length required beveled edge aluminum thresholds where necessary.

3.04 CLEANING AND PROTECTION

A. Prior to final acceptance, repair any flooring defects and remove any stains that have penetrated the new finish.

B. Protect completed flooring during construction period with heavy kraft paper or other suitable covering to prevent damage to or deterioration of flooring and finish until final facility acceptance. Do not use plastic sheet or film that could cause condensation.

END OF SECTION



PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
    1. Flooring and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.
B. Related Documents
    1. Drawings and General Provisions of the Contract (including General and Supplementary Conditions and Division 1 sections) apply to the work of this section.
C. Related Sections:
    1. Division 3 Concrete; not the work of this section.
    2. Division 6 Rough Carpentry
    3. Division 9 Rubber Base.

1.02 REFERENCES

A. ASTM International:
    1. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
    2. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
    3. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
    4. ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring
    5. ASTM F 1066 Standard Specification for Vinyl Composition Tile
    6. ASTM F 1861 Standard Specification for Resilient Wall Base
    7. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
    8. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
B. National Fire Protection Association (NFPA):
    1. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
    2. NFPA 258 Standard Test Method for Measuring the Smoke Generated by Solid Materials

1.03 SYSTEM DESCRIPTION

A. Performance Requirements: Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer without defects, damage, or failure.
B. Administrative Requirements
    1. Pre-installation Meeting: Conduct an on-site pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

2. Pre-installation Testing: Conduct pre-installation testing as follows: moisture tests, bond test and pH test.

C. Mock-ups: Install at the project site a job mock-up using acceptable products and manufacturer approved installation methods, including concrete substrate testing. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and workmanship standards.
   1. Mock-Up Size: 6'X 6' minimum.
   2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

D. Sequencing and Scheduling
   1. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.
   2. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond, moisture tests and pH test.

1.04 SUBMITTALS

A. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions.

B. Submit the manufacturer's standard samples showing the required colors for flooring and applicable accessories.

C. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
   2. Warranty: Warranty documents specified herein

D. Attic stock of tiles and adhesive must be provided.

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

B. Select an installer who is competent in the installation of Bentley Mills vinyl enhanced tile flooring.
   1. Engage installers certified as Bentley Mills Certified Installers
   2. Confirm installer's certification by requesting their credentials

C. Fire Performance Characteristics: Provide resilient tile flooring with the following fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:
   1. ASTM E 648 Flooring Critical Radiant Panel, Class I
   2. ASTM E 662 (Smoke Development) Maximum Specific Optical Density of 450 or less.

1.06 DELIVERY, STORAGE AND HANDLING

A. Comply with Division 1 Product Requirements Sections

B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.

D. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

1.07 PROJECT CONDITIONS

A. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65ºF (18ºC) and a maximum temperature of 85ºF (29ºC) for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55ºF (13ºC) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

1.08 LIMITED WARRANTY

A. Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.
B. Limited Warranty Period: 5 years.
C. The Limited Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.
D. For the Limited Warranty to be valid, this product is required to be installed using the appropriate Bentley Mills Installation System.

1.09 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials from same production run as products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Quantity: Furnish quantity of flooring units equal to 5% of amount installed.
2. 72 hours after installation is completed, initial maintenance procedures must be implemented in accordance with manufacturer's requirements. Refer to Vinyl Enhanced Tile Maintenance Instructions for complete maintenance details.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Resilient tile flooring, wall base, adhesives and accessories:

1. Bentley Mills, 14641 Don Julian Rd., City of Industry, CA 91746

2.02 RESILIENT TILE FLOORING MATERIALS

A. Provide Bentley Mills Guardian Series Hybrid Vinyl Tile

1. Colors and Pattern

a. Typical standard pattern as follows:

1. 70% Panzer 323

2. 20% Sentinel 324

3. 10% Pebble 336

b. Above colors shall be laid out in a random pattern

2. Size: 18 in. x 18 in.
3. Wear layer thickness: 0.020 (0.5 mm)
4. Thickness: 2.5mm
5. Texture: Flooring shall be slip-resistant

2.03 PRODUCT SUBSTITUTION

A. Substitutions: Approved Equal

2.05 ADHESIVES

A. As recommended/manufactured by Bentley Mills

2.06 ACCESSORIES

A. For patching, smoothing, and leveling monolithic concrete substrate, provide patching and leveling materials as recommended by the manufacturer.

B. For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.

C. Provide transition/reducing strips tapered to meet abutting materials.

D. Provide threshold of thickness and width as shown on the drawings.

E. Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

F. Provide metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-

type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog, installation instructions, and product carton instructions for installation and maintenance procedures as needed.

3.02 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (i.e. moisture tests, bond test, pH test, etc.).
B. Visually inspect flooring materials, adhesives and accessories prior to installation. Flooring material with visual defects shall not be installed and shall not be considered as a legitimate claim.
C. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.
D. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
E. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.03 PREPARATION

A. All subfloors must be permanently dry, clean, smooth, and structurally sound. The surface must be free of all dust, loose particles, solvents, paint, grease, oil, wax, alkali, sealing/curing compounds, old adhesive, and any other foreign material, which could affect the installation and adhesive bond to the substrate. Permanent and non-permanent markers, pens, crayons, paint, or similar marking tools used to mark the substrate or the back of the resilient flooring material will cause migratory staining. Subfloor contamination or markings that bleed through the flooring material causing discoloration or staining are excluded from the Bentley Mills Limited Warranty. All substrate contaminants must be mechanically removed prior to the installation of the flooring material. NOTE: Do not use liquid solvents or adhesive removers. Caution: Do not use oil based sweeping compounds. Fill all depressions, cracks, and other surface irregularities with a good quality Portland cement based underlayment patching compound appropriate for this purpose. Bentley Mills does not recommend installing over existing resilient floors. All existing flooring and adhesives must be mechanically removed prior to installing the new flooring material – Do not use chemical adhesive removers or solvents. Refer to the Resilient Floor Covering Institute (RFCI), Recommended Work Practices for Removal of Existing Resilient Flooring for best work practices. Caution: Some

resilient flooring products and adhesives contain "asbestos fibers" and special handling of this material is required.

B. Concrete subfloors must be constructed as recommended by the American Concrete Institute's ACI 302.2 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials and prepared in accordance with ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring. Do not install Bentley Mills flooring over expansion joints, control joints, or other moving joints in the substrate. These joints must be respected and should not be filled with products that are not intended for that purpose. Contact an expansion joint cover manufacturer to meet specific flooring conditions. All concrete subfloors must be tested for moisture and pH (alkalinity): Moisture testing must be conducted in accordance with ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes or ASTM F 1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride. Following ASTM F 2659 Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and Other Floor Slabs and Screeds Using a Non-destructive Electronic Moisture Meter can provide qualitative information prior to performing ASTM F 2170 or ASTM F 1869. Acceptable moisture limits can be found in the adhesive section below, on the adhesive label, and in the adhesive specifications online. Test results must not exceed the limits of the adhesive. If the tests results exceed the limitations, the installation must not proceed until the problem has been corrected. Bentley Mills does not recommend or warrant any particular product or procedure for the remediation of high moisture in concrete substrates. There are several companies that manufacture products suitable for moisture remediation. We suggest you refer to the current ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient © 2017 Bentley Mills Page 2 of 3 ID_20170830_EN_VET Flooring and ASTM F 3010 Standard Practice for Two Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Flooring Systems. A pH test for alkalinity must be conducted. Acceptable pH range of the adhesive can be found in the adhesive section below, on the adhesive label, and in the adhesive specifications online. Results must not exceed the limits of the adhesive. If the test results are not within the acceptable range, the installation must not proceed until the problem has been corrected.

C. Wood subfloors must have a minimum 18" (47 cm) of crossventilated space between the bottom of the joist and ground. Exposed earth crawl spaces must be sealed with a polyethylene moisture barrier. Subfloors must meet local and national building codes. Trade associations, such as the APA -The Engineered Wood Association, offer structural guidelines for meeting various code requirements. Refer to ASTM F 1482 Standard Practice for Installation and Preparation of Panel Type Underlayments to receive Resilient Flooring, for additional information. Single Floor Wood Construction and Tongue and Groove subfloors must be covered with 1/4" (6.4 mm) or 1/2" (13 mm) APA approved underlayment plywood. Use 1/4" (6.4 mm) thick underlayment panels for boards with a face width of 3" (76 mm) or less. For boards wider than 3" (76 mm) face width use 1/2" (13 mm) underlayment panels. Countersink nail heads and fill depressions, joints, cracks, gouges, and chipped edges with a good quality Portland cement based patching compound designed for this purpose. Do not install over OSB (Oriented Strand Board), particle board, chipboard, lauan or composite type underlayments.

D. An adhesive bond test must be performed using the actual flooring materials and adhesive to be installed. The test areas must be a minimum of 36" x 36" and remain in place for at least 72 hours and then evaluated for bond strength to the concrete

3.04 INSTALLATION OF FLOORING

A. Tile Installation Procedure:

1. Batch numbers should not be mixed during the installation.
2. Square the area and establish reference points on the substrate.
3. Apply the adhesive to the substrate and allow proper open time. Open and working times are dependent on the ambient temperature, humidity, substrate porosity and temperature, and air movement. It is the installer’s responsibility to modify the open and working time for jobsite conditions.
4. Use established reference points and install the flooring.
5. Lay tiles so the graining follows the same direction. The printed numbers on the back may be used as a reference.
6. Tiles should be lightly butted together when placing the flooring into the adhesive.
7. Do not force tiles together creating a ledge condition at the seams and corners. Sliding tiles will force the adhesive out between the seams.
8. When using 975 Two-Part Urethane Adhesive the installer MUST work off the flooring.
9. Periodically, lift the corner of an installed tile to ensure proper transfer of adhesive.
10. Roll floor in both directions with a 100 pound three-section roller. Use a small hand roller in areas that cannot be reached with a large roller.
11. Inspect the floor surface, especially seams, and remove any adhesive on the surface.

3.05 INSTALLATION OF ACCESSORIES

A. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths as long as practical, with inside corners fabricated from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.

B. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.

C. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.

D. Apply [butt-type] [overlap] metal edge strips where shown on the drawings, [before] [after] flooring installation. Secure units to the substrate, complying with the edge strip manufacturer's recommendations.

3.06 CLEANING

A. Perform initial and on-going maintenance according to the HYBRID VINYL TILE FLOORING Installation Instructions.

3.07 PROTECTION

A. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings. (See HYBRID VINYL TILE FLOORING Installation Instructions.)

END OF SECTION

SECTION 09 6513

RUBBER BASE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Topset coved rubber base for installation with surface flooring.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 03 3543 – Architectural Polished Concrete System.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's published technical data describing materials, construction and recommended installation instructions. Submit technical data and installation instructions for each adhesive material.

B. Maintenance Instructions: Submit manufacturer's recommendations for maintenance, care and cleaning of base.

C. Samples: Submit Samples of top set base in each available color. Following color selections, submit Samples, not less than 12 inches long of each selected color and type. Submit pint cans of each type adhesive.

D. Maintenance Materials: Before Substantial Completion, deliver at least 50 lineal feet and five outside corner units of each color of rubber base installed. Deliver the materials in unopened factory containers or in sealed cartons with labels identifying the contents, matching installed materials. Include unopened cans of adhesives adequate to install the maintenance materials.

E. Shop Drawings: Contractor shall submit shop drawings indicating location of base with quantity for use by owner in ordering.

1.03 QUALITY ASSURANCE

A. Qualifications of Installer: Minimum five years experience in successfully installing the same or similar flooring materials.

B. Comply with the following as a minimum requirement:

1. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM F1861: Standard Specification for Resilient Wall Base.

3. Comply with current CHPS requirements, www.chps.net.

4. Chemically based products such as sealers, primers, fillers, adhesives, etc. must be approved by Owner's Office of Environmental Health and Safety (OEHS).

5. Each selected color and configuration shall be from same dye lot and color.

1.04 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the Project site in original unopened manufacturer's packaging clearly labeled with manufacturer's name. Store materials at room temperature, but not less than 70 degrees F, for a minimum of 48 hours before installation, unless otherwise indicated in manufacturer's printed instructions.

1.05 PROJECT CONDITIONS

A. Ventilation and Temperature: Verify areas that are to receive rubber base are ventilated to remove fumes from installation materials, and areas are within temperature range recommended by the various material manufactures for site installation conditions.

1.06 WARRANTY

A. Manufacturer shall provide a five year material warranty.

B. Installer shall provide a two year fabrication and installation warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Johnsonite or equal.

2.02 MATERIALS

A. Rubber base: OWNER FURNISHED CONTRACTOR INSTALLED.

B. Base Adhesive (contractor furnished): Water based, low odor type, as recommended by manufacturer of rubber base.

PART 3 - EXECUTION

3.01 COORDINATION

A. Coordinate the Work of this section with other sections to provide a level, smooth and clean finish surfaces to receive rubber base.

3.02 EXAMINATION

A. Field verify dimensions and other conditions affecting the Work of this section before commencing the Work of this section.

B. Before Work is started, examine surfaces that are to receive rubber base. Deficiencies shall be corrected before starting the Work of this section.

3.03 PREPARATION

A. Do not start preparation until adjacent concrete floor slabs are at least 90 days old and finish flooring is installed.

B. Install rubber base when ambient temperature is 70 degrees F. or higher.

3.04 INSTALLATION

A. Install top set base at hard floors, including resilient flooring, concrete and wood, carpet and other soft floors.

B. Securely fasten cement base to backing in long lengths in accordance with manufacturer's recommendations. Lay out lengths so that not less than 18 inches long filler pieces are provided. Assure that top and toe continuously contact the wall and floor, and that all joints are tight. Install matching factory formed external corners at all offsets. Inside corners shall be coped; wrapped corners are not acceptable.

C. Use of adhesive gun is prohibited. Apply adhesive directly to substrate using the appropriate notched trowel or spreader according to manufacturer's instructions. Maintain 1/8 inch gap from top of base to prevent adhesive oozing onto adjacent surfaces.

D. Base and outside corners shall be rolled with a seam roller before adhesive sets.

3.05 CLEANING

A. Maintain surfaces of base clean as installation progresses. Clean rubber base when sufficiently seated and remove foreign substances.

B. Clean adjacent surfaces of adhesive or other defacement. Replace damaged and/or defective Work to the specified condition.

3.06 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.07 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 6816
CARPET

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General Conditions and Division 1 - General Requirements apply to this section.

B. Section Includes:

1. Tufted Carpet as indicated
2. Installation Accessories.

C. Related Sections:

1. Section 09 6513 - Rubber Base.

1.02 SUBMITTALS

A. Shop Drawings: Submit dimensioned layout of carpet seaming.

B. Product Data: Submit the following:

1. Carpet manufacturer's recommended installation directions.

2. Technical data and installation instructions for each adhesive and sealer material.

3. Carpet manufacturer's published instructions for maintenance, care, cleaning and repair of carpet.

C. Supply field verified carpet order yardage submittal for District to place order.

E. Submission of all materials proposed for use shall be per Section 01 3300.

1.03 QUALITY ASSURANCE

A. Carpet Installation: Comply with CRI 104 - Standard for Installation of Textile Floor Covering Materials, and carpet manufacturers written installation instructions as well as CDPH standard practice testing.

B. Each color of carpet shall be of the same dye lot.

C. Carpet installation shall comply with CBC Section 11B-302.2.

D. Carpet edges shall comply with CBC Section 11B-303.

E. Installer qualifications: An experienced installer who is certified by the International Certified Floor Covering Association at the Commercial II certification level.

F. Surface Flammability Passes CPSC FF 1-70 (ASTM D-2859)

G. Flooring Radiant Panel Class 1 (mean average CRF: 0.45 w/sq cm or higher) (ASTM E-648)

H. Smoke Generation Less than 450 (ASTM E-662)

1.04 DELIVERY, STORAGE AND HANDLING

A Comply with CRI 104.

B. Store material at least 24 hours at room temperature prior to installation.

C. Deliver fire-rated materials with testing agency labels and required fire classification numbers attached and legible.

1.05 JOB CONDITIONS

A. Ventilation and Temperature: Verify areas to be carpeted are ventilated to remove fumes from installation materials, and areas are within temperature range recommended by the material manufacturers for Project site installation conditions. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive and have pH range recommended by carpet manufacturer.

B. Contractor to schedule a Pre-Floor Covering Installation Meeting through the Construction Manager to review sub-floor preparation, verification of readiness for floor covering installation and use of the correct products, verification of the acclamation of correct finish materials and review installation requirements.

C. Protection: Prohibit traffic on carpet or at least 12 hours after installation. Cover carpet with heavy non-staining kraft paper in areas where the Work of other trades is to be performed and/or traffic and passage areas. Protect carpet from damage or soiling. Maintain protection in place until Final Completion.

1.06 WARRANTY

A. Special Warranty for carpet: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship with specified warranty period.

1. Warranty Period: lifetime from date of Substantial Completion.

1.07 ACCESSIBILITY GUIDELINES

A. Carpet shall be securely attached and shall have a firm cushion, pad, or backing or no cushion or pad. It shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height shall be 1/2" maximum.

B. Exposed edges shall be fastened to floor surfaces and shall have trim on the entire length. Carpet edges shall comply with CBC Section 11B-303.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND PRODUCTS

A. Carpet: Tarkett, Ethos Modular with Omnicoat Technology™ applied with TarkettTAPE™ which requires no Ph, MVER, OR In-Situ/RH testing provided there is no evidence of free liquids. Carpet material will be the same for all locations receiving carpet. Carpet material to be supplied by Contractor.

1. Style: Corded Cloth 11570 24"x24" Ethos with Omnicoat Technology™ modular carpet tile

2. Color: NIGHT VALE 60801

3. Material: TDX SD Solution Nylon. 100% Solution dyed (Permanent Stain Resistance)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Before installation is started, examine surfaces to receive carpet. Deficiencies shall be corrected before starting Work of this section. Contractor will be responsible for contacting the manufacturer for the correct installation specifications for each type of substrate application.

B. Concrete floors: Verify that concrete slabs comply with ASTM F710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet manufacturer.

C. Field verify dimensions and other conditions affecting this Work before commencing carpet installation.

D. Plan take-off and proper estimates for yardage needed to complete job. Contractor will be held responsible for original estimate.

E. The Contractor is responsible for the seam diagrams for all applications, supplying all materials necessary for installation with the exception of carpet itself, following manufacturer's installation instruction exactly.

3.02 PREPARATION

A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation",

and with carpet manufacturer's written installation instructions for preparing substrates.

B. Conditioning of Materials: Carpet and adhesives shall be conditioned at the Project site at not less than 65 degrees F and relative humidity between 10 percent and 65 percent for 48 hours prior to installation.

3.03 CARPET INSTALLATION

A. General: Install carpet in accordance with requirements of CRI 104, Section 9, Direct Glue-Down Installation" except where more stringent requirements are specified herein or recommended by carpet materials manufacturers.

B. Install carpet rolls in each dye lot in the number sequence as furnished by manufacturer. Roll out carpet in one direction and do not reverse direction at any locations. Align carpet with centerline of room or space, and adjust at edges for wall variations.

C. Color Control: Install dye lot in the number sequence at locations indicated to prevent shading variations. Install only one dye lot for each area of building unless otherwise reviewed. If more than one dye lot is required, obtain prior review of color match between dye lots.

D. Carpet Runs: Install carpet in one-piece lengths between permanent walls unless otherwise required. Seams are permitted only where shown on the layout Shop Drawings. Install corridor carpet in one-piece sizes for full length and width, cross seaming only where corridors change direction.

E. Laying and Seaming: Cut carpet for seams between tuft rows and prevent damage to tufts or loops, prevent edge ravels, and preserve uniform tuft row alignment and spacing on both sides and across seams. Install carpet with tuft or loop rows in straight lines both ways, free of offsets, waviness, distortion, or misalignment. Cut seam edges straight and square with backing. Trim carpet at walls, columns, and penetrations for a compressed fit.

F. Doorways: Extend carpet into doorways without piecing in and seam to the carpet on other side of door under door centerline except where metal thresholds occur; no small filler pieces of carpet will be permitted at doorways.

3.04 PROTECTION

A. Protect carpets from damage.

3.05 CLEANING

A. As each carpeted area is completed, clean up all dirt and debris, remove spots and soiling with proper cleaner, trim off loose threads with sharp scissors, and vacuum entire area clean.

3.06 CLEAN-UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project

site.

3.07 INSTRUCTION

A. Before Final Completion of the Work, provide a 4 hour District instruction period for proper maintenance of carpeting. Instructions shall be provided by technical representative of manufacturer.

3.09 PROTECTION

A. Protect the Work of this section until Final Completion in compliance with CRI 104, Section 16.” Protecting Indoor Installations.

END OF SECTION

3

SECTION 09 7720

FIBERGLASS REINFORCED WALL PANELS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Prefinished polyester glass reinforced plastic sheets and adhered to gypsum wallboard.

1.02 REFERENCES

A. American Society for Testing and Materials: Standard Specifications (ASTM)

1. ASTM D 256 - Izod Impact Strengths (ft #/in)

2. ASTM D 570 - Water Absorption (%

3. ASTM D 638 - Tensile Strengths (psi) & Tensile Modulus (psi)

4. ASTM D 790 - Flexural Strengths (psi) & Flexural Modulus (psi)

5. ASTM D 2583- Barcol Hardness

6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.

7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.

C. Selection Samples: Submit manufacturer’s standard color pattern selection samples representing manufacturer's full range of available colors and patterns.

D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required.

1. Submit complete with specified applied finish.

2. For selected patterns show complete pattern repeat.

3. Exposed Molding and Trim: Provide samples of each type, finish, and color.

E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants and other pertinent materials prior to their delivery to the site.

1.04 QUALITY ASSURANCE

A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:

1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)

a. Wall Required Rating – Class [A] [C].

B. Sanitary Standards: System components and finishes to comply with:

1. United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.

2. Food and Drug Administration (FDA) 1999 Food Code 6-101.11.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials factory packaged on strong pallets.

B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (range of 60 to 75°F) for 48 hours prior to installation.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work

B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.

1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.07 WARRANTY

A. Furnish one year guarantee against defects in material and workmanship.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. Marlite; 1 Marlite Drive, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com www.marlite.com. Or approved equal

B. Product:

1. Standard FRP

2.02 PANELS

A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.

1. Coating: Multi-layer print, primer and finish coats or applied over-layer.

2. Dimensions:

a. Thickness – 0.090 “ (2.29mm) nominal

b. Width - 4'-0” (1.22m) nominal

c. Length – [10’-0” (3.0m)][8’-0” (2.4m)][As indicated on the drawings] nominal

3. Tolerance:

a. Length and Width: +/-1/8 “ (3.175mm)

b. Square - Not to exceed 1/8 “ for 8 foot (2.4m) panels or 5/32 “ (3.96mm) for 10 foot (2.4m) panels

B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.

1. Flexural Strength - 1.0 x 104 psi per ASTM D 790. (7.0 kilogram-force/square millimeter)

2. Flexural Modulus - 3.1 x 105 psi per ASTM D 790. (217.9 kilogram-force/square millimeter)

3. Tensile Strength - 7.0 x 103 psi per ASTM D 638. (4.9 kilogram-force/square millimeter)

4. Tensile Modulus - 1.6 x 105 psi per ASTM D 638. (112.5 kilogram-force/square millimeter)

5. Water Absorption - 0.72% per ASTM D 570.

6. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.

7. Izod Impact Strength of 72 ft. lbs./in ASTM D 256

C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.

D. Front Finish: As Indicated on the Drawings

a. Color: P100 White

b. Surface: Smooth.

c. Fire Rating: Class A (I)

d. Size: 48” x 96” [1.2m x 2.4m] x .090” (3mm) nom.

2.03 BASE

A. Marlite Cove Base Molding for .090” (2.29mm) thick FRP Panels

1. Color: White

2. Profile: V65 Base Cove

2.04 MOLDINGS

Aluminum Trim: Heavy weight extruded aluminum 6063-T5 alloy prefinished at the factory.

1. Profiles :

a. F 550 Inside Corner, 8’ length

b. F 561 Outside Corner, 8’ length

c. F 565 Division, 8’ length

d. F 570 Edge, 8’ length

e. Color: Brite Anodized

2.05 ACCESSORIES

A. Fasteners: Non-staining nylon drive rivets.

1. Match panel colors.

2. Length to suit project conditions.

B. Adhesive: Either of the following construction adhesives complying with ASTM C 557.

1. Marlite C-551 FRP Adhesive - Water- resistant, non-flammable adhesive.

2. Marlite C-915 Construction Adhesive - Flexible, water-resistant, solvent based adhesive, formulated for fast, easy application.

3. Titebond Advanced Polymer Panel Adhesive – VOC compliant, non-flammable, environmentally safe adhesive.

C. Sealant:

1. Marlite Brand MS-250 Clear Silicone Sealant.

PART 3 – EXECUTION

3.01 PREPARATION

A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.

1. Verify that stud spacing does not exceed 24” (61cm) on-center.

B. Repair defects prior to installation.

1. Level wall surfaces to panel manufacturer’s requirements. Remove protrusions and fill indentations.

3.02 INSTALLATION

A. Comply with manufacturer's recommended procedures and installation sequence.

B. Cut sheets to meet supports allowing 1/8” (3 mm) clearance for every 8 foot (2.4m) of panel.

1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.

2. Pre-drill fastener holes 1/8” (3mm) oversize with high speed drill bit.

a. Space at 8” (200mm) maximum on center at perimeter, approximately 1” from panel edge.

b. Space at in field in rows 16’ (40.64cm) on center, with fasteners spaced at 12” (30.48 cm) maximum on center.

C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.

1. Install panels with manufacturer's recommended gap for panel field and corner joints.

a. Adhesive trowel and application method to conform to adhesive manufacturer’s recommendations.

b. Drive fasteners for snug fit. Do not over-tighten.

D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.

1. All moldings must provide for a minimum 1/8 “ (3mm) of panel expansion at joints and edges, to insure proper installation.

2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.03 CLEANING

A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.

B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

END OF SECTION 09 7720

SECTION 09 8100
ACOUSTICAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Acoustical insulation and sealants.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 07 2100 - Thermal Insulation.

3. Section 09 2216 - Non-Structural Metal Framing.

1.02 SUBMITTALS

A. Product Data:

1. Provide manufacturer's printed Product Data for each product.

2. Provide manufacturer's printed installation instructions.

1.03 QUALITY ASSURANCE

A. Fire Ratings: Comply with CBC Section 720 and fire-resistance and flammability ratings specified.

B. Acoustic Performance: Acoustic Insulation shall be tested in accordance to ASTM C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method, with Type A (#4) mounting.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect insulation from physical damage and from becoming wet or soiled.

B. Comply with manufacturer's recommendations for handling, storage and protection during installation.

PART 2 - PRODUCTS

2.01 ACOUSTICAL INSULATION

A. Unfaced Mineral/Glass Fiber Blanket/Batt Acoustical Insulation: Acoustical insulation produced by combining mineral/glass fibers with thermosetting resins to comply with ASTM C665, Type I.

1. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50 when tested in accordance with ASTM E84.

2. Manufacturers: Johns Manville "Sound Control Batts", Owens Corning "Sound Attenuation Batts", or equal.

3. Thickness: 3-inch unless otherwise indicated.

2.02 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Concealed Joints: Non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound:

1. Pecora Corp. "BA-98".

2. Tremco Inc. "Tremco Acoustical Sealant".

3. Hilti, Inc. “CP 506”.

4. Equal.

B. Acoustical Sealant for Exposed Joints: Non-oxidizing, skinnable, paintable, gunnable sealant recommended for sealing interior exposed joints to reduce transmission of airborne sound.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with manufacturer's instructions for installation conditions.

B. Do not install insulation until building is sufficiently enclosed or protected against absorption of moisture by the insulation, and do not install insulation unless supporting framing and construction is in a thoroughly dry condition.

C. Install snugly between framing members with ends snugly fitted between units and against adjacent construction.

D. Carefully cut and fit insulation around pipes, conduit, and other obstructions and penetrations.

E. Where door and window frames occur in framing; cut additional strips of insulation and hand-pack as required to fill voids in and around such frames.

F. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated. Install sealants in accordance with manufacturer's instructions.

3.02 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose off of Project site.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 8450

ACOUSTIC WALL PANELS
HYBRID SOUND PANELS - DIFFUSIVE + ABSORPTIVE (BAD™ Panels)

3

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hybrid Sound Panels – Diffusive + Absorptive: Binary Amplitude Diffusion Panel, Model BAD™.

1.02 RELATED SECTIONS

A. Section 09 2900 – Plaster & Gypsum Board

1.03 ALTERNATES

A. Prior Approval: Proposed substitutions for products in this section may be submitted to the architect and acoustical consultant no later than ten (10) working days prior to the bid due date. Substitutions shall only be considered if submitted with complete information including acoustic data and a sample not smaller than 59 cm x 59 cm (23" x 23") showing product design, composition and finish. Acceptance of substituted products is contingent on the architect's and acoustical consultant's approval and the substitution's compliance with all specified criteria. The architect shall approve substitution request via addendum.
B. Unapproved Substitutions. Substitutions not approved via addendum shall not be submitted to the architect or acoustical consultant.

1.04 REFERENCES

A. Local Building Code – Current Edition
B. International Organization for Standardization
   1. ISO 354 Measurement of Sound Absorption in a Reverberation Room
   2. ISO 10534 - Determination of sound absorption coefficient and impedance in impedance tubes - Part 1: Method using standing wave ratio.
   3. ISO 17497-1 Sound-scattering properties of surfaces- Part 1: Measurement of the random-incidence scattering coefficient in a reverberation room.
C. AES-4id-2001: AES Information Document for Room Acoustics & Sound Reinforcement Systems – Characterization & Measurement of Surface Scattering Uniformity.
D. American Society for Testing & Materials (ASTM)
   1. ASTM E 1050-98 - Standard Test Method for Impedance and Absorption of Acoustical Materials Using a Tube, Two Microphones, and a Digital Frequency Analysis System
   2. ASTM C 423 - Sound Absorption & Sound Absorption Coefficients by the Reverberation Room Method
   3. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials
E. Published technical papers
   1. T.J. Cox, B-I.Dalenback, P. D'Antonio, J.J. Embrechts, J.Y. Jeon, E. Mommertz and M. Vorlaender, "A tutorial on scattering and diffusion coefficients for room acoustic surfaces", Acta Acustica uW Acustica, 92, 1-15 (2006)
   2. AES-4id-2001, "AES Information document for room acoustics and sound reinforcement systems- Characterization and measurement of surface scattering uniformity", J. Audio Engineering Soc., 49(3), 149-165 (2001)
   3. E. Mommertz, Appl. Acoust., 60(2), 201-204 (2000)

1.05 SYSTEM DESCRIPTION

A. Design Requirements: Panels shall absorb sound via a porous core that converts sound energy to heat through molecular friction and diaphragmatic action of the template against the "spring" force of the semi-rigid, porous absorptive core. High frequency absorption shall be determined by the percent open area and mid frequency absorption shall be determined by the thickness of the diaphragmatic surface binary template. Panels shall diffuse reflected sound via planar, variable impedance, outer surface layer with perforations sized and located according to an optimized binary sequence, forming a binary amplitude grating. The optimized binary-hole pattern shall not be arbitrary or random, but

based on an optimal 2D binary sequence that has low side lobes and a delta function at the origin of the autocorrelation.

B. Performance Requirements

1. Random Incidence Sound Absorption Coefficients (a): Tested by independent, accredited, NVLAP facility according to ASTM C 423 and ASTM E 795 for an A mounting.

Thickness	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
2-1/4”	0.30	0.84	1.10	1.11	0.85	0.46

2. Noise Reduction Coefficient (NRC): Tested by independent, accredited, NVLAP facility according to ASTM C 423 and ASTM E 795 for an A mounting.

NRC = 1.00 (2-1/4”) SAA = 0.95 (2-1/4”)

3. Sound Diffusion Coefficients (sound diffusive/absorptive panel): Tested in accordance with AES-4id-2001. Average incidence diffusion coefficients shall be obtained from an average of 35 measurements of incidence angles at 5 degree intervals between +/- 85 degrees.

1/3 Octave Band Centers (Hertz) – All Panel Thicknesses

630	800	1000	1250	1600	2000	2500	3150	4000
0.31	0.49	0.61	0.66	0.65	0.51	0.40	0.41	0.42

5000	6300	8000	10000	12500	16000	20000
0.55	0.52	0.43	0.49	0.47	0.38	0.28

Sound Diffusion Coefficients (reference panel): Tested in accordance with AES-4id-2001. Average incidence diffusion coefficients shall be obtained from an average of 35 measurements of incidence angles at 5 degree intervals between +/- 85 degrees.

1/3 Octave Band Centers (Hertz)

630	800	1000	1250	1600	2000	2500	3150	4000
0.40	0.55	0.56	0.47	0.43	0.37	0.34	0.31	0.31

5000	6300	8000	10000	12500	16000	20000
0.25	0.12	0.09	0.11	0.00	0.00	0.00

1.06 SUBMITTALS

A. Product Data: Submit standard manufacturer product cut sheet showing product and selected options. Attach index of distinct panels indicating number of like panels, panel size and thickness, edge condition and fabric selection.

B. Design Data / Test Reports: Submit sound absorption coefficients, noise reduction coefficient, sound diffusion coefficients and fire testing data for composite panels. Panel component test data is not sufficient.

C. Shop Drawings: Submit manufacturer’s cut sheets with dimensions and angle information for all non-rectangular panels.

D. Samples: Submit 6” x 6” fabric sample for each type of fabric specified.

1.07 QUALITY ASSURANCE

A. Qualifications: Manufacturer and installation contractor shall have a minimum of three years’ experience with similar systems.

B. Single Source: All products under this section shall be supplied by a single manufacturer to ensure consistency in product size and finish.
C. Flame Spread / Smoke Developed Characteristics: Components tested by an independent, accredited facility according to ASTM E 84:
   a. Flame Spread Rating: 25 (maximum)
   b. Smoke Developed: 450 (maximum)
D. Pre-Installation Meeting: Installing contractor shall organize and conduct pre-installation meetings with all other trades to coordinate substrate conditions, conditioning of the space (temperature & humidity), and elements attaching to, penetrating through or concealed above/behind work in this section.

1.08 DELIVERY STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading: Panels are susceptible to damage and shall be removed from packaging and handled with care. Panels greater than 16 square feet shall be carried by a minimum of 2 people. Panels shall never be set down on fabric faces, only on panel backsides.
B. Storage and Protection: Store panels in original packaging until ready to install. Store panels in temperature and humidity controlled conditions for 24 hours prior to installation and protect from moisture and infestation. Protect fabric finish from elements that would puncture, tear, snag or otherwise damage the fabric.
C. Acceptance at Site: Ensure that all project environmental requirements have been met prior to unpacking or installing fabric panels and all products. Full or partial installation constitutes complete product acceptance.
D. Waste Management and Disposal: Dispose of all packaging materials and debris in a safe and environmentally responsible manner according to the instructions set forth by the General Contractor, local ordinances or codes and the Environmental Protection Agency.

1.09 PROJECT CONDITIONS

A. Project Environmental Requirements: Prior to unpacking or installing fabric products, ensure that the installation area is fully enclosed and protected from moisture and direct sunlight. Ensure that the building's mechanical systems are fully operational and will not be turned off again even for testing and balancing of the mechanical systems. Coordinate with other trades to ensure that all work above or behind fabric surfaces is complete and that all wet and dusty trades have completed work.
B. Product Acclamation: For a minimum period of seventy-two (72) hours and prior to unpacking or installing any fabric products, allow both the installation area and the fabric products to stabilize in temperature and humidity levels that are representative of the final temperature and humidity levels expected after building completion and occupation. Do not install products if the humidity exceeds 65%.
C. Product Handling: Handle fabric panels carefully so as to avoid pulling or snagging the fabric finish or edges.

1.10 WARRANTY

A. Submit to Owner or Owner's Representative a written and dated warranty issued by the fabric ceiling/wall panel manufacturer warranting the fabric panels against defects in materials or manufacturing for a period of one (1) year from the date of delivery.
B. Components used in the system but not provided by the manufacturer are excluded from the manufacturer's warranty. Damage caused by exposure to moisture or rapid or extreme changes to temperature or humidity are excluded from the manufacturer's warranty. Damage caused by improper storage, handling, acclimatization, or installation is excluded from the warranty. Appearances and colorings of fabric products can vary over time and as site conditions change and are therefore excluded from the warranty.

1.11 OWNER'S INSTRUCTIONS

A. Installing contractor shall provide to the building owner or to the owner's representative a copy of the manufacturer's maintenance manual supplied with the panels.

1.12 MAINTENANCE

A. Extra Materials: If provided per the project requirements, extra materials shall remain in the manufacturer's original, unopened packaging and shall be given to the building owner or owner's representative upon substantial completion of work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. RPG Acoustical Systems, LLC, 99 South St, Passaic, NJ 07055 (telephone) 973-916-1166, http://www.rpgacoustic.com.

2.02 MATERIALS

A. Core: Semi-rigid fiberglass, density not less than 6 pounds per cubic foot and not more than 8 pounds per cubic foot.
B. Template: 1/4" thick high-density, Class A fire rated fiberboard, density not less than 95 pounds per cubic foot.
C. Scrim: White, open weave, fire-rated cloth (required for white or very light color fabrics).
D. Edges: Hardened
E. Fabric: Open weave, Class A, polyester, without backing layer such as pattern FR701-2100 by Guilford of Maine (Grand Rapids, MI). Color per architect selection.
F. Fabric: Knoll Textiles, KT Collection, Hourglass Series. Color to be selected by architect.

2.03 MANUFACTURED UNITS

A. Thickness (nominal): 3-1/4"
B. Length (maximum): 120"
C. Width (maximum): 48"
D. Weight: 1.125 lbs per square foot (1" thickness)
E. Edge Shape: Square, Beveled, Mitered, Angled, or Radius Cut
F. Cut Outs: Factory or field.

2.04 ACCESSORIES

A. Fasteners: Panels are supplied with selected standard Manufacturer's mounting hardware.

2.05 FABRICATION

A. Shop Assembly: Panels will be preassembled prior to arrival at project site. No field assembly is required.
B. Fabrication Tolerances – Panel sizes shall be within +/- 1/16" of specified sizes.

PART 3 EXECUTION

3.01 INSTALLERS

A. Only qualified installers with 3 years (minimum) experience installing similar products shall install panels.

3.02 EXAMINATION

A. Site Verification of Conditions: Examine installation area for compliance with all manufacturers' project environmental requirements and ensure uninstalled products have been stored, handled and acclimatized properly prior to commencing installation. Inspect all substrates for completion and quality of work to ensure that surfaces are level, plumb, clean, dry and completely cured from water or solvent evaporation. Do not commence installation if the structural capacity of the substrate is questionable or inadequate.
A. Coordination with Other Trades: Coordinate with all other trades to ensure that wet work including concrete, terrazzo, plastering, painting, etc. in the installation area is complete, cured and dry prior to installation. Coordinate with all other trades to verify that components associated with mechanical, electrical, lighting, data, telecommunication, audio, video, fire suppression and other building systems are installed behind or above designated installation areas prior to commencing installation. Coordinate the exact size, location and sequencing of building system components that are required to penetrate the fabric ceiling/wall panels.

3.03 PREPARATION

A. Protection: Protect surrounding work so as to avoid damage during installation of Panels.

B. Surface Preparation: Inspect substrate and ensure surface is flat, clean and dry without protruding elements that would otherwise interfere with panel installation.
C. Field Measure: Prior to commencing installation, measure panels and ensure that dimensions correspond to field measured dimensions of installation area.

3.04 INSTALLATION

A. Install panels per manufacturer's mounting instructions.
B. Install panels so that fabric-covered side with template faces into occupied space. Rectangular panels have no designated top or bottom and may be installed in either direction. Refer to architectural drawings for orientation of non-rectangular panels.
C. Substrate wall (CMU block, drywall, etc…) must be shimmed to level, both horizontally and vertically, in order for panel faces to align properly in a sequential array.
D. Panels with square edges should be installed with a minimum 1/8 inch gap at all vertical and horizontal seams.

3.05 CLEANING

A. Following installation, clean fabric on panels with high quality fabric cleaner per fabric manufacturer's instructions. Test for color fastness on scrap or concealed material.

3.06 DEMONSTRATION

A. Demonstrate to the building owner or to the owner's representative the safe and proper method for removing and replacing all types of accessible panels.
B. Supply the building owner or the owner's representative with any special tools provided by the manufacturer required to unlatch safety hardware on accessible panels.

3.07 PROTECTION

A. After installation, protect panels against dirt, water and contact that would puncture, snag, tear or otherwise damage panel fabric.

END OF SECTION

SECTION 09 9000

PAINTING AND COATING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior and exterior painting.

B. Following items shall not be painted:

1. Brass valves, chromium or nickel-plated piping and fittings.

2. Boiler control panels and control systems.

3. Fabric connections to fans.

4. Flexible conduit connections to equipment, miscellaneous name plates, stamping, and instruction labels and manufacturer's data.

5. Mechanical and electrical utility lines, piping and heating and ventilation ductwork in tunnels, under-floor excavated areas or crawl spaces, attic spaces and enclosed utility spaces.

6. Flag, floodlight, parking light poles and loudspeaker poles, metal stairs, handrails and chain-link fence with a galvanized finish, unless otherwise noted.

7. Structural and miscellaneous steel, open web steel joists and metal floor decking, which will not be exposed in final construction, shall have no finish other than one coat of shop primer.

8. Hardboard covering on tops and backs of counters and benches.

9. Brass, bronze, aluminum, lead, stainless steel and chrome or nickel-plated surfaces.

10. Non-metallic walking surfaces unless specifically shown or specified to be painted.

1.02 REGULATORY REQUIREMENTS

A. Paint materials shall comply with the Food and Drug Administration’s (F.D.A.) Lead Law and the current rules and regulations of local, state and federal agencies governing the use of paint materials.

1.03 SUBMITTALS

A. List of Materials: Before submittal of samples, submit a complete list of proposed paint materials, identifying each material by distributor's name, manufacturer’s name, product name and number, including primers, thinners, and coloring agents, together with manufacturers’

catalog data fully describing each material as to contents, recommended installation, and preparation methods. Identify surfaces to receive various paint materials.

B. Material Samples: Submit manufacturer's standard colors samples for each type of paint specified. Once colors have been selected, submit Samples of each color selected for each type of paint accordingly:

1. Samples of Paint and Enamel must be submitted on standard 8 ½" x 11" Leneta Opacity-Display Charts. Each display chart shall have the color in full coverage. The sample shall be prepared from the material to be installed on the Work. Identify the school on which the paint is to be installed, the batch number, the color number, the type of material, and the name of the manufacturer.

2. Elastomeric shall be submitted in duplicate samples of the texture coating. Samples will be not less than 2 ½ by 3 ½ in size and installed upon backing. Finished Work will match the reviewed Sample in texture.

3. Materials and color samples shall be reviewed before starting any painting.

C. For transparent and stained finishes, prepare samples on same species and quality of wood to be installed in the Work, with written description of system used.

1.04 QUALITY ASSURANCE

A. Certification of Materials: With every delivery of paint materials, the manufacturer shall provide written certification the materials comply with the requirements of this section.

B. Coats: The number of coats specified is the minimum number. If full coverage is not obtained with the specified number of coats, install additional coats as required to provide the required finish.

C. Install coats and undercoats for finishes in strict accordance with the recommendations of the paint manufacturer as reviewed by the Architect.

D. Paint materials shall comply with the following as a minimum requirement:

1. Materials shall be delivered to Project site in original unbroken containers bearing manufacturer's name, brand number and batch number.

2. Open and mix ingredients on premises in presence of the Project Inspector.

1.05 DELIVERY, STORAGE AND HANDLING

A. Storage and Mixing of Materials: Store materials and mix only in spaces suitable for such purposes. Maintain spaces clean and provide necessary precautions to prevent fire. Store paint containers so the manufacturer's labels are clearly displayed.

1.06 SITE CONDITIONS

A. Temperature: Do not install exterior paint in damp, rainy weather or until surface has thoroughly dried from effects of such weather. Do not install paint, interior, or exterior, when temperature is below 50 degrees F, or above 90 degrees F, or dust conditions are unfavorable for installation.

1.07 WARRANTY

A. Manufacturer shall provide a three year material warranty.

B. Installer shall provide a three year application warranty.

1.08 MAINTENANCE

A. Provide at least one gallon of each type, color and sheen of paint coating installed. Label containers with color designation indicated on Drawings.

PART 2 - PRODUCTS

2.01 PAINT MATERIALS

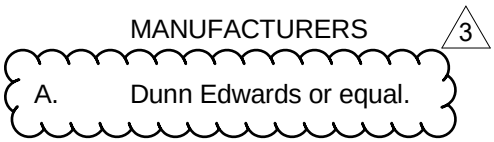
A. Furnish the products of only one paint manufacturer unless otherwise specified or required. Primers, intermediate and finish coats of each painting system must all be the products of the same manufacturer, including thinners and coloring agents, except for materials furnished with shop prime coat by other trades.

B. Factory mix paint materials to correct color, gloss, and consistency for installation to the maximum extent feasible.

C. Paint materials to be minimum “Architectural Grade”.

D. Gloss degree standards shall be as follows:

HIGH GLOSS	70 and above	EGGSHELL	30 to 47
SEMI-GLOSS	48 to 69	SATIN	15 to 29

2.02 MANUFACTURERS 

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine surfaces to receive paint finish. Surfaces which are not properly prepared and cleaned or which are not in condition to receive the finish specified shall be corrected before prime coat is installed.

B. New woodwork shall be thoroughly cleaned, hand sandpapered, and dusted off. Nail holes, cracks or defects in Work shall be filled. On stained woodwork, fill shall be colored to match stain. Filling shall be performed after the first coat of paint, shellac or varnish has been installed.

C. Plaster surfaces except veneer plaster shall be allowed to dry at least 3 weeks before painting. Veneer plaster shall be allowed to dry sufficiently to receive paint as determined by moisture meter tests.

D. Metal surfaces to be painted shall be thoroughly cleaned of rust, corrosion, oil, foreign materials, blisters, and loose paint.

E. Do not install painting materials to wet, damp, dusty, dirty, finger marked, rough, unfinished or defective surfaces.

F. Concrete surfaces shall be dry, cleaned of dirt and foreign materials and in proper condition to receive paint. Neutralize spots demonstrating effects of alkali.

G. Mask off areas where necessary.

3.02 APPLICATION

A. Backpainting: Immediately upon delivery to the Project site, finish lumber and millwork shall be backpainted on surfaces that will be concealed after installation. Items to be painted shall be backpainted with priming coat specified under "Priming".

B. Priming: New wood and metal surfaces specified to receive paint finish shall be primed. Surfaces of miscellaneous metal and steel not embedded in concrete, and surfaces of unprimed plain sheet metal Work shall be primed immediately upon delivery to the Project site. Galvanized metal Work and interior and exterior woodwork shall be primed immediately after installation. Priming of surfaces and priming coat shall be as follows:

1. Knots, Pitch and Sap Pockets: Shellac before priming.

2. Exterior Woodwork and Wood Doors: Prime with one coat of exterior waterborne emulsion wood primer.

3. Interior Woodwork: Where indicated to be painted, prime with one coat of waterborne wood primer.

4. Stain: Woodwork indicated to receive a stain and varnish finish shall be stained to an even color with water borne stain. On open-grained hardwood, mix stain with paste filler and completely fill pores in wood.

5. Galvanized Metal Work: Clean oil, grease and other foreign materials from surfaces. Install vinyl wash pretreatment coating. Follow manufacturer's instructions for drying time, and then prime with one coat of metal primer.

6. Unprimed Iron, Steel, and Other Uncoated Metals: Where specified to be painted, prime with one coat of metal primer.

7. Shop Primed Metal Items: Touch up bare and abraded areas with metal primer before installation of second and third coats.

8. Coats shall be installed evenly and with full coverage. Finished surfaces shall be free of sags, runs and other imperfections.

C. Allow at least 24 hours between coats of paint.

D. Rollers shall not be used on wood surfaces.

E. Each coat of painted woodwork and metal, except last coat, shall be sandpapered smooth when dry. Texture-coated gypsum board shall be sanded lightly to remove surface imperfections after first coat of paint has been installed.

F. Each coat of paint or enamel shall be a slightly different tint as required. Each coat of paint, enamel, stain, shellac, and varnish will be inspected by the IOR before next coat is applied. Notify the Project Inspector that such Work is ready for inspection.

1. Tinting Guideline: The first coat, primer/undercoat(s) to be untinted or tinted up to 50 percent lighter or darker (at the discretion of the installer) than the finish coat. The second coat (or third coat if a seal coat and undercoat have been specified) is to be factory tinted in the range of 10 percent to 15 percent lighter or darker (at the discretion of the installer) than the finish coat. The final coat is to be factory tinted to the required color selected. These tinting guidelines shall be provided on all surfaces receiving paint.

G. Do not "paint-out" UL labels, fusible links and identification stamps.

H. Paint Roller, brush and spray.

1. Only Paint rollers shall be used on interior plaster, drywall, masonry/plaster and plywood surfaces, nap shall not exceed one half inch in length.

2. First coat on wood overhang and ceilings shall have material applied by roller and then brushed out in a professional manner to leave surface free of imperfections. Finish coat may be sprayed.

3. Other surfaces shall have all coatings applied with brushes of proper size.

4. Spray work is permitted only on radiators, acoustic plaster, masonry and plaster.

I. Where ceilings are specified to be painted, beams, cornices, coves, ornamental features, plaster grilles, etc. shall be included.

J. Ceilings shall be white, including classrooms, storage rooms, offices, arcades, etc. Boiler room and fan room ceiling color shall match adjacent walls.

3.03 CLEANING

A. Remove rubbish, waste, and surplus material and clean woodwork, hardware, floors, and other adjacent Work.

B. Remove paint, varnish and brush marks from glazing material and, upon completion of painting Work, wash and polish glazing material both sides. Glazing material, which is damaged, shall be removed and replaced with new material.

C. Clean hardware and other unpainted metal surfaces with recommended cleaner. Do not furnish abrasives or edged tools.

3.04 SCHEDULE

A. Interior:

1. Woodwork and Wood Doors, Painted: 3 coats.

a. First Coat: As specified in this section under Priming.

b. Second and Third Coats: Interior enamel, semi-gloss.

7. Plaster: 4 coats.

a. First Coats: Pigmented wall sealer.

b. Second coat: Enamel under coater.

c. Third and Fourth Coats – Interior enamel, semi-gloss as indicated.

8. Gypsum Board: 4 coats.

a. First Coat: Drywall sealer.

b. Second Coat: Enamel under coater.

c. Third and Fourth Coats: Interior enamel, gloss at restrooms, semi-gloss elsewhere.

11. Metal: Shall be cleaned, pre-treated and painted with 3 coats. Items to be painted include, but are not limited to: exposed structural and miscellaneous steel, metal doors and frames, ladders, table and bench legs.

a. First Coat: Metal primer.

b. Second and Third Coats: Interior gloss enamel, except metal doors and frames which shall be semi-gloss or gloss to match adjacent wall.

B. Exterior:

3. Plaster and Stucco: 3 coats. Semi-gloss 100 percent acrylic.

a. Prime Coat: Alkali resistant primer/sealer.

b. Exterior 100 percent acrylic.

6. Metal: 3 coats. Shall be cleaned and pre-treated. Items to be painted include, but are not limited to: steel columns and miscellaneous steel items, gravel stops, metal doors and frames, hoods and flashings.

a. First Coat: As specified in this section under Priming.

b. Second and Third Coats: Exterior semi-gloss enamel.

C. Mechanical and Electrical Work:

1. Except where interior mechanical and electrical Work to be painted is specified to receive another paint finish, Work occurring in finished rooms and spaces shall be cleaned, pre-treated, and painted with 3 coats. Items to be painted include, but are not limited to: steel and copper piping, pipes, vents, fittings, ducts, plenums, miscellaneous supports and hangers, electrical conduit, fittings, pull boxes, outlet boxes, unfinished surfaces of plumbing fixtures, miscellaneous metal cabinets, panels, and access doors and panels.

a. First Coat: As specified in this section under Priming.

b. Second and Third Coats: Interior enamel, semi-gloss or gloss enamel to match adjacent wall or ceiling finish.

2. Insulation and Taping on Pipes and Ducts: 3 coats.

a. Finished Rooms:

1) First Coat: Interior waterborne primer.

2) Second and Third Coats: Interior semi-gloss enamel to match adjoining wall or ceiling finish.

b. Building Exterior:

1) First Coat: Exterior waterborne primer.

2) Second and Third Coats: Exterior gloss enamel.

3. Inside surfaces of ducts, vents, dampers and louvers as far back as visible from room in which they open shall be painted with 2 coats of flat black paint.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 09 9100

CONCRETE SEALER/DUSTPROOFER FLOORING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

1. Furnish and install the sealer/dustproofer flooring system as specified and indicated. Prior to installation, provide decontamination and cleaning as specified. The term “sealer/dustproofer flooring system” as used in this section will include the first coat, optional second coat, and any related materials for the project.

2. Complete the sealer/dustproofer flooring system installation in strict accordance with these specifications, the coating system manufacturer’s most current requirements for surface preparation, application and inspection, and the instructions for safety. In the event of a conflict between these specifications and the manufacturer’s instructions, the more stringent requirements will apply.

3. The Contractor shall be responsible for providing ventilation, initial cleaning, inspection, supervision, dust control and equipment protection as specified herein and related sections for the work associated with this Section. The Contractor is responsible for all other work associated with this Section including protection of existing equipment and structures in the work area, surface preparation, sealer/dustproofer flooring application, curing, coating repair, rework, inspection and supervision.

1.02 RELATED SECTIONS

Division 1 General Requirements

1.03 REFERENCES:

1. Society for Protective Coatings (SSPC) Specifications and Standards:

   1. SSPC-PA-3: “A Guide to Safety in Paint Application”.

   2. SSPC-SP-13: “Surface Preparation of Concrete”.

2. NACE (National Association of Corrosion Engineers)

   1. NACE Publication 6D-173, “A Manual for Painter Safety”.

   2. NACE Publication 6G-164, “Surface Preparation Abrasives for Industrial Maintenance Painting”.

3. ASTM (American Society for Testing and Materials)

   1. ASTM D4541 - L.R. “Standard Method for Pull-Off Strength of Coatings using Portable Adhesion Testers”.

   2. ASTM E337 - L.R. “Standard Practice Test Method for Measuring Humidity with a Psychrometer”.

   3. ASTM D4263-83 (1999), “Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method”.

   4. ASTM F1869-98, “Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride”.

5. ASTM D4414-95, “Standard Practice for Measurement of Wet Film Thickness by Notched Gages”.

6. ICRI Guide No. 03732, “Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays,” International Concrete Repair Institute, Sterling, VA.

7. ASTM 4262, “Standard Test Method for Measuring Surface pH of Acid Etched Concrete”.

8. ASTM D4259, “Standard Practice for Abrading Concrete”.

1.04 DEFINITIONS

1. Terms used in this Section are defined as follows:

1. Concrete Sealer/ Dustproofer Flooring Work - The aspects involved with proper application of the specified sealer/dustproofer flooring system, including but not limited to cleaning, surface preparation, mixing, application, curing, and quality control.

2. Approved Materials - The coating system, blast media, and other specified materials for this coating work.

3. Wet Film Thickness - The primer or coating films’ actual thickness immediately following application. Wet film thickness is measured in mils or thousandths of an inch (0.001") and is abbreviated WFT.

4. Dry Film Thickness - The primer or coating films’ actual thickness following curing and drying. Dry film thickness is measured in mils or thousandths of an inch (0.001") and is abbreviated DFT.

5. Coating System Manufacturer - Refers to the approved coating Manufacturer, abbreviated as CSM in this Section.

6. Manufacturer’s Technical Representative(s) - Refers to the technical representative(s) of the approved CSM.

7. A/E - Architectural or Engineering Firm.

1.05 QUALITY ASSURANCE

1. The Contractor shall meet the following requirements:

1. The Contractor is ultimately responsible for the workmanship and quality of the sealer/dustproofer flooring system installation. Inspections by the Owner, the Engineer, or others do not limit the Contractor’s responsibility.

2. Do not use or retain contaminated, outdated, or diluted materials for flooring. Do not use materials from previously opened containers.

3. Use only products of the approved CSM. Provide the same products for repairs as for the original coating.

4. If any requirements of this specification are contradicted by a referenced standard or vice-versa, the matter shall be resolved in writing by the A/E or its representative.

5. Make available at all times all locations and phases of the work for access and inspection by the Engineer, the Owner, or other personnel designated by the Owner. The Contractor shall provide ventilation, egress, and whatever other means are required for the Owner, Engineer, or designated personnel to access and exit the work areas safely.

6. Conduct work so that the sealer/dustproofer flooring system is installed as specified herein. Inspect work continually to ensure that the coating system is installed as specified herein. The A/E shall inspect the work to determine conformance with the contract documents.

7. The Contractor's Supervisor shall be on site at all times and will be thoroughly familiar with the work in progress. This Supervisor shall have authority to receive and execute all direction provided by the A/E or the Owner.

8. The methods of construction shall be in accordance with all requirements of this specification and the best trade practices. Any changes in sealer/dustproofer flooring system installation requirements shall be allowed only with the written approval of the A/E.

9. Installation shall be performed by an applicator having satisfactory experience in the application of these or similar materials or with on-site consultation by a qualified field service representative of the CSM.

10. Submit VOC levels for sealers to meet California Green Building Code of Regulations, Part 11, (CalGreen) for Low Emitting Material Guidelines.

11. The sealed concrete surface shall have a Coefficient of Friction (C.O.F.) of at least 0.6 per ASTM C1028.

1.06 SUBMITTALS

1. Submit the following prior to commencing with any phase of the work covered by this Section:

1. Manufacturer's current printed recommendations and product data sheets for all sealer/dustproofer flooring system products including performance criteria, surface preparation and applications, volatile organic compound (V.O.C.) data, and safety requirements.

2. Material Safety Data Sheets (MSDS) for any materials brought on-site including all floor coating system materials, solvents, and abrasive blast media.

3. Contractor's written verification that the personnel who will perform this work have the required experience as specified in 1.05 1.9. This document must list the names of all of the Contractor's supervisors and tradespeople who will perform work on the project covered by this Section.

4. List of cleaning and thinner solutions allowed by the CSM.

5. Storage requirements including temperature, humidity, and ventilation for Coating System Materials.

2. Owner, contractor, and manufacturer's representative shall review and mutually agree upon color, grade, and final texture of coating system before starting installation. The acceptance of a sample will constitute the job standard by which installation will proceed.

1.07 DELIVERY, STORAGE, AND HANDLING

1. Material shall be delivered to project site in manufacturer's original unopened containers.

2. Materials shall be stored indoors, protected from damage, moisture, direct sunlight and temperatures below 40 degrees F or above 90 degrees F.

3. Store all materials only in area or areas designated by the Owner solely for this purpose. Confine mixing, thinning, clean-up and associated operations, and storage of coating materials related debris before authorized disposal, to these areas. All materials are to be stored on pallets or similar storage/handling skids off the ground.

4. Mix all coating materials in a designated enclosed mixing area. This enclosed area must protect the mixing operation and materials from direct sunlight, inclement weather, freezing, or other means of damage or contamination. Protect all other concrete and metallic surfaces and finishes from any spillage of material(s) within the mixing area.

5. Do not use drain piping for disposal of coating materials.

6. The Contractor shall take all precautions and implement all measures necessary to avert potential hazards associated with the sealer/dustproofer flooring system materials as described on the pertinent Material Safety Data Sheets or container labels.

7. Deliver all materials to the job site in new, unopened containers. Each container shall bear the CSM's name and label.

1. Labels on all material containers must show the following information:

1. Name or title of product.
2. Manufacturer's batch number.
3. Manufacturer's name.
4. Generic type of material.
5. Application and mixing instructions.
6. Hazardous material identification label.
7. Shelf life date.

2. All containers shall be clearly marked indicating any personnel safety hazards associated with the use of or exposure to the materials.

3. All materials shall be handled and stored to prevent damage or loss of label.

4. Do not use or retain contaminated, outdated, prematurely opened, diluted materials, or materials which have exceeded their shelf life.

1.08 ENVIRONMENTAL CONDITIONS

1. Surfaces and surrounding air temperatures must exceed 55 degrees F, but must be less than 90 degrees F, with materials at not less than 70 degrees F during application.

2. Do not apply coating materials when dust is being generated.

3. If existing facility lighting is not adequate for flooring system application, the Contractor shall provide all temporary lighting during the work equivalent to one 200 watt explosion proof incandescent lamp per 100 square feet of work area.

PART 2 - PRODUCTS

2.01 MATERIALS

1. Consolideck® LS, penetrating lithium silicate treatment, or equal.

2.02 MANUFACTURER

1. PROSOCO, Inc., 3741 Greenway Circle, Lawrence, KS 66046. Phone: (800) 255-4255; Fax: (785) 830-9797. E-mail: CustomerCare@prosoco.com or equal.

PART 3 - EXECUTION

3.01 GENERAL

1. Protection

Mask, cover, or otherwise protect all surfaces, equipment, and finishes not to receive the sealer/dustproofer flooring system specified in this Section.

2. Strictly follow the approved CSM's written instructions and the requirements of this specification regarding all aspects of sealer/dustproofer flooring work including: mixing, application, recoat times and curing.

3. Mock-up

1. Prior to commencing the installation, the Contractor shall install with the owner's approval, a mutually agreed upon mock-up test sample to show final color and appearance of the sealer/dustproofer flooring system.

3.02 PREPARATION

1. Allow new concrete to cure for 28 days. Verify dryness by testing for moisture with a "plastic film tape-down test". (Reference ASTM D4263)

2. Shot-blast or mechanically abrade to remove laitance, curing compounds, sealers and other contaminants and to provide surface profile. (Reference ASTM D4259, ICRI CSP3-5).

3. Vacuum clean concrete to remove all dirt, dust, and other loose materials.

4. After mechanically abrading, verify that all surfaces are clean, dry and free of any contaminants, which could adversely affect the adhesion of the flooring system.

5. If between final surface preparation work and sealer/dustproofer flooring system application, contamination of the prepared and cleaned substrates occurs, recleaning shall be required until the requirements of this Section are met.

3.03 INSTALLATION

1. Primer: The sealer/dustproofer shall be mechanically mixed, applied and cured in strict accordance with manufacturer's printed instructions. Apply uniformly as to "wet out" the concrete.

2. Topcoat (Optional): The sealer/dustproofer shall be mechanically mixed, applied and cured in strict accordance with manufacturer's printed instructions. Apply uniformly as to "wet out" the concrete.

3.04 CLEANUP

1. Remove waste materials, rubbish, and debris and dispose of them at the owner's direction. Leave work areas in a clean and tidy condition.

3.05 PROTECTION

1. Protect the completed work from water, airborne particles or other surface contaminants until cured for a minimum of 24 hours after application.

2. Protect from traffic, physical abuse, immersion and chemical exposure until the complete system has thoroughly cured for 24 hours at 75 degrees F. For different temperatures, consult the manufacturer's representative about curing times.

3.06 FIELD QUALITY CONTROL INSPECTION AND TESTING

1. Inspection by the Architect, Owner or others does not limit the Contractor's responsibilities for quality as specified herein or as required by the CSM's instructions.

2. The Contractor shall perform the Q.C. procedures listed below in conjunction with the requirements of this Section. The Engineer will inspect the work to determine conformance to the contract documents.

1. Degree of Cleanliness.

Visually inspect the degree of cleanliness of substrates to meet the requirements of this Section. The pH of the concrete substrates will be measured using pH indicating papers. pH testing is to be performed once every 100 sq. ft. of surface area to be coated.

Acceptable pH values shall be between 8.0 and 11.0 as measured by a full-range (1-12) color indicating pH paper with readable color calibrations and a scale at whole numbers (minimum). Use Hydrion Insta-Chek Jumbo 0-13 or 1-12 or equal. The paper shall be touched to the surface once using moderate finger pressure. The surface shall not be wiped or moved laterally to disturb the surface during pH testing. Following the one touch, lift the paper vertically to not "wipe" the surface. Compare the color indicated with the scale provided and record the pH.

Note: If the surface of the concrete is dry, it is not possible to take a pH measurement. However, pH values are still important on dry surfaces. When a dry concrete substrate is encountered for a pH test, the surface where the pH test is to be performed shall be sprayed lightly with distilled, deionized water from a commercially available spray bottle that has been properly rinsed to remove any dissolved solids. The spray shall just wet the surface to a "shiny" appearance. Wait 60 seconds to allow chemical equilibria to be established and then test the pH of the water on the surface. Perform this test in accordance with ASTM D4262.

2. Concrete Surface Profile

Using the replicate rubber specimens inspect the concrete surface profile in accordance with ICRI Guide No. 03732. This should be performed once for every 100 square feet of surface area to be coated.

3. Measure and record ambient air temperature once every two hours of each shift using a thermometer and measure and record substrate temperature once every two hours using a surface thermometer.

4. Measure and record relative humidity every two hours of each shift using a

sling

psychrometer in accordance with ASTM E337.

5. Inspect correct mixing of coating materials in accordance with the CSM's instructions.

6. Inspect and record that the "pot life" of coating materials used are not exceeded during installation.

7. Measure and record the thickness of the coating system using a notched gauge in accordance with ASTM D4414 for Wet Film Thickness at least once every 10 sq. ft. of coating area.

8. Perform moisture tests on concrete as follows:

    1. Once for every 500 square feet of surface area to be coated, perform the plastic sheet test in accordance with ASTM D4263. If moisture is indicated, proceed to step 2 below.

    2. Perform calcium chloride moisture tests in accordance with ASTM D1869 once for every 1000 square feet of surface area to be coated. The maximum limit for moisture vapor emissions rate should be 3.0 lbs. per 24 hours per 1000 sq. ft. If tests indicate rates higher than 3.0, consult with Tnemec's Technical Service for further evaluation.

9. Inspect to verify proper curing of the sealer/dustproofer flooring system as recommended by the CSM.

END OF SECTION

SECTION 10 1400

SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General Conditions and Division 1 - General Requirements apply to this section.

B. Section Includes:

1. Interior room signs, interior directional signs, geometric restrooms signs, evacuation plans, exterior regulation signage, exterior directional signage, and exterior building signs.

1.02 DEFINITIONS

A. Accessible Route: A continuous unobstructed path that complies with ADA, CBC and 2019 CBC 11B-307.

B. Characters: Letters, numbers punctuation marks and typographic symbols.

C. Circulation Path: An exterior or interior way of passage from one place to another for pedestrians, including, but not limited to, walks, hallways, courtyards, stairways, and stair landings.

D. Common Use: Interior and exterior rooms, spaces, or elements made available for the use of students, staff, or others visiting or utilizing facilities.

E. Facility: Portions of buildings, structures, site improvements, complexes, equipment, roads, walks, passageways, parking lots, or other real or property located on a Project site.

F. ISA: International Symbol of Accessibility

G. Pictogram: A pictorial symbol, which is recognized as representing activities, facilities, or concepts.

H. Sign: An Architectural element composed of displayed text, symbolic, tactile or pictorial information.

I. Space: A definable area, such as a room, toilet room, hall, assembly area, entrance, storage room, alcove, courtyard or lobby.

J. Tactile: An object that can be perceived through the sense of touch. Braille shall be California Grade 2 with rounded or domed dots.

1.03 SYSTEM DESCRIPTION

A. Comply with the most stringent requirements of Americans with Disabilities Act Accessibility Guidelines (ADAAG) and CBC. Standards are based on ICC/ANSI A117.1.

B. Parking Lot Entrance Signs and Accessible Parking Space Identification Signs:

1. Parking lot entrance signs shall comply with CBC, warning that cars parked in parking spaces reserved for people with disabilities will be towed.

2. Parking spaces reserved for people with disabilities shall be identified with a reflective sign featuring the ISA, which shall comply with CBC. Van accessible spaces shall be identified with the term "Van Accessible." (CBC 11B-502.6)

3. Reserved parking spaces shall also be identified by the ISA at the foot of the space in compliance with CBC. (CBC 11B-502.6). Access aisles shall be striped as required. (ANSI 117.1).

4. All Parking lot signage to be .125" aluminum panels with baked porcelain enamel finish mounted to 3" galvanized steel post set in 36" x 12" concrete footing.

C. Circulation Path Signs:

1. Circulation path signs leading from public right of ways, public transportation, and/or parking lots that are not accessible or do not lead to accessible entrances to the building, shall be located at decision points directing people with disabilities to the accessible routes and/or entrances. Signs shall include the ISA. (ANSI 117.1. 703.7) Such signs shall be installed so those steps will not have to be retraced. (CBC 11B-703.4.1, 11B-703.4.2).

D. Building Entrance Signs:

1. Accessible building entrances shall be identified with the ISA. (CBC 11B-703.4.1, 11B-703.4.2). Inaccessible entrances shall have a sign, which includes the ISA, directing to the nearest accessible entrance this sign shall be placed at the last decision point before reaching the inaccessible entrance. (CBC 11B-703.4.1, 11B-703.4.2). Building entrances shall have a sign stating "No Smoking", in accordance with California statute prohibiting smoking in public buildings.

E. Room Identification Signs:

1. Each permanent rooms and space identified by a sign shall have a sign installed adjacent to the door it identifies, with raised characters and Braille, in conformance with ANSI 117.1 (703.2 or 703.3). This includes entrances to rooms and spaces, which are entered, by an exterior entrance or by a door off an interior corridor or courtyard. (CBC 11B-703).

2. Restroom identification signs shall include a gender pictogram in a 6-inch high field. Pictogram field shall be located above the raised character and Braille text on the tactile sign, which is to be located adjacent to the door in conformance with ANSI 117.1 (703.2 or 703.3, CBC 11B-703) Restrooms shall be identified as follows:

   a. WOMEN
   b. MEN
   c. GIRLS

d. BOYS
e. RESTROOM (for unisex, single person restrooms).

3. A geometric sign placed on the door shall also identify each restroom. The sign for women and girls' restrooms is a circle. The sign for men and boys' restrooms is a triangle. Unisex restrooms are identified by a triangle on and within the boundary of a circle with contrasting (70% minimum) from circle to triangle to gender pictographs. (CBC 11B-703.7.2.6) Accessible restrooms shall include the ISA, (CBC 11B-703.7.2.1), a minimum of 4 inches high, centered on the geometric sign on the door. Per11B-703.7.2.6.4 Edges and vertices on geometric symbols. Edges shall be eased or rounded at 1/16 inch (1.59 mm) minimum, or chamfered at 1/8-inch (3.2 mm) maximum. Vertices shall be radiused between 1/8-inch (3.2 mm) minimum and 1/4-inch (6.4 mm) maximum.

4. If there is not adequate space for a sign immediately adjacent to the door, and the door opens inward, the gender pictogram, the ISA, and the raised characters and Braille can be included on the geometric sign installed on the door. In the case of restrooms with no doors, but only shielded entrances, the geometric sign can also include the required elements and be installed adjacent to the entrance.

5. All room identification signage to be integral color with fused raised lettering and California Braille.

I. Directional Signs for Accessible Elements:

1. Directional signs for inaccessible restrooms shall be installed at decision points directing disabled people to accessible restrooms. Signs shall include the ISA along with appropriate text and /or arrows, in conformance to ANSI 117.1 (703.4 and 703.7).

1.04 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating locations, sizes of signs and lettering, construction details, anchoring details, layout, and quantities.

B. Material Samples: Submit colors and textures Samples of materials to be furnished for signs.

C. Room and Building designations need to be approved by designated District representative.

1.05 QUALITY ASSURANCE

A. Comply with ICC/ANSI A117.1. American National Standard. Accessible and Usable Buildings and Facilities.

B. Qualifications:

1. Tactile signs: Manufacturers shall have been regularly engaged manufacturing Braille and raised character identifying devices for minimum of 5 years.

2. Non-tactile signs: Manufacturers shall have been regularly engaged in manufacturing signs for minimum of 5 years.

1.06 DELIVERY, STORAGE AND HANDLING

A. Provide all means necessary to protect signs.

1.07 WARRANTY

A. Provide an unconditional 2-year installation warranty commencing on recordation date of the Notice of Completion, in addition to the manufacturer's standard warranty.

B. The Contractor shall perform a site review with the designated District Representative prior to the expiration of warranty as a condition to end installation warranty period.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. For the purpose of establishing quality, the following products, manufactured by H. Toji and Company, or equal:

B. Tow-Away Signs:

1. 18 inches x 24 inches x 0.080 inch aluminum, rounded corners. White reflective graphics on dark blue reflective background. Character styles and proportions shall comply with ANSI 117.1 (703.4) and shall be a minimum of one inch high. H. Toji and Company 4.603, or equal.

2. Sign shall be installed on a wall or pole at each entrance to the parking lot or lots on the Project site.

C. Accessible Parking Identification Signs:

1. 12 inches x 18 inches, 0.080 inch aluminum, rounded corners. White reflective graphics on dark blue reflective background. ISA shall be minimum 8 inches high. Van accessible spaces shall include the words "Van Accessible" below the pictogram on the same sign, or a separate sign with the words shall be installed below the ISA sign. H. Toji and Company Style 4.601, 4.602, or equal.

2. Sign shall be installed on a wall or a pole at the head of each accessible parking space. Signs in the public way shall be installed with the bottom edge of the sign a minimum of 80 inches above the pavement or ground. Signs in a planting area, parking strip or on a wall shall be installed with the bottom edge of the sign a minimum of 60 inches above the pavement or ground; comply with ANSI A117.1.

2.02 EXTERIOR DIRECTIONAL AND INFORMATIONAL SIGNS

A. Accessible Path of Travel Signs:

1. 0.080 inch aluminum rounded corners; white on dark blue background; non-glare, high contrast signs. ISA minimum 4-1/2 inches high, conforming to ANSI 117.1-1198 (703.7). Text to conform to ANSI 117.1 (703.4). H. Toji and Company Style 3.1, or equal.

2. Sign to be mounted on post or wall with the lower edge of the sign between 48 inches and 60 inches above the ground or surface.

B. Other Informational and Directional Signs: Signs to be non-glare and high contrast. Text to conform to ANSI 117.1 (703.4). H. Toji and Company Style 3.1, or equal.

2.03 ENTRY SIGNS

A. Room Entry Signs:

1. Solid entry doors: thermoformed through body color acrylic with integral, raised characters painted in a contrasting color.

2. Signs shall be installed or mounted 48” min from the finish floor to the baseline of braille and 60” max from the finish floor to the top line of text. Signs may be mounted on window or exterior wall immediately adjacent to door or on door itself.

2.04 GEOMETRIC RESTROOM DOOR SIGNS

A. Signs shall comply with CBC (11B-703). Geometric signs shall be thermoformed through body color acrylic with integral, raised characters painted a contrasting color (light to dark, or dark to light). Circle shall be 12 inches in diameter; stand-alone triangle shall have equal sides 12 inches in length. Triangle placed on circle shall not protrude outside of circle. When restroom or other sanitary facility is accessible.

B. Signs shall be installed on the door leading into the restroom or other sanitary facility, centered on the door, and with the center of the sign 60 inches from the finish floor

2.05 PAINTED SCHOOL LOGO/MASCOT SIGNS

A. Signs shall be painted aluminum and attached to wall per drawings. Refer to architectural drawings for size, location, and design. Color shall be selected from the manufacturer’s full spectrum of colors.

PART 3 - EXECUTION

3.01 GENERAL

A. Non-glare (non-reflective) materials shall be furnished for signs, which identify, direct to, or give information about facilities and their use. Signs shall be thermoformed with a though-body color. Parking, traffic signs, and exterior safety signs may be furnished

with reflective materials. Identification sign for accessible parking spaces shall be furnished with reflective materials.

B. Characters shall have a minimum of 70 percent contrast with their backgrounds on signs which identify, direct to, or give information about facilities and their use per CBC 11B-703.5.1, CBC 11B-703.6.2 and CBC 11B-703.7.1 . Characters on signs shall be raised 1/32 inch minimum and shall be sans serif uppercase characters accompanied by Grade 2 Braille. Raised characters shall be a minimum of 5/8 inch and maximum of 2 inches high.

C. Character styles, proportions and sizes on signs shall comply with ANSI 117.1 (703.4.2.) and CBC 11B-703.5, whichever is most stringent. Characters required to be tactile shall comply with ANSI 117.1 (703.2.4 and/or 703.3.3) and CBC 11B-703.2, whichever is most stringent.

D. Braille translations of room and space identifications shall be Grade 2 and Braille cells and dots shall comply with ANSI 117.1 (703.5) and CBC, (11B-703.3) whichever is most stringent.

E. Pictograms and Symbols of Accessibility shall comply with the standards in ANSI A117.1. (703.6 and/or 703.7).

F. Restrooms shall be identified with a geometric symbol on the door, which complies with CBC (CBC 11B-703).

G. Signs required by the State Fire Marshal shall comply with CBC.

3.02 METHODS OF INSTALLATION

A. Interior Identification Signs and Interior Directional Signs:

1. Fasten to wall with 4 tamper-proof round-head screws, one at each corner of sign. Furnish plastic anchors.

2. When concealed installation is specified, install backplate to wall as above. Fasten sign to backplate with very high-bond double-faced tape.

3. For installation on glass, fasten sign to glass with very high bond double faced tape. On opposite side of glass, anchor matching backplate to glass with very high-bond double-faced tape.

B. Geometric Signs: Geometric toilet room signs shall be fastened to doors with 3 tamper-proof oval-head counter-sunk screws.

C. Exterior Post Mounted Directional Signs: Install by post mount. Size of required footing shall be as indicated.

D. Exterior Wall Mounted Identification Signs and Directional Signs:

1. Aluminum signs: Fasten to wall with 4 tamper-proof round-head screws, one at each corner of sign. Furnish plastic anchors.

2. Thermoformed signs: Install backplate to wall as above. Fasten sign to backplate with very high-bond double-faced tape and silicone.

E. Exterior Building Sign:

1. Each letter shall be furnished with a minimum of 3 cast mounting lugs on backside, drilled and tapped to receive installation bolts.

2. Letters shall be installed according to manufacturer's method PMC-1. Letters shall be installed 3/4 inch away from wall surface, by an aluminum sleeve spacer.

3.03 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.04 PROTECTION

A. Protect the Work of this section until Final Completion.

3.05 INSPECTION

A. Per 11B-703.1.1.2 Signs and identification devices shall be field inspected after installation and approved by the enforcing agency prior to the issuance of a final certificate of occupancy per Chapter 1, Division II, Section 111, or final approval where no certificate of occupancy is issued. The inspection shall include, but not be limited to, verification that Braille dots and cells are properly spaced and the size, proportion and type of raised characters are in compliance with these regulations.

END OF SECTION

SECTION 10 2113

HIGH DENSITY POLYETHYLENE TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 01 apply to this section.

B. Section Includes:

1. Toilet compartments, urinal screens and vision screens as indicated.

C. Related Sections:

1. Section 10 2813: Toilet Accessories.

1.02 SYSTEM DESCRIPTION

A. Design Requirements: Design and fabrication shall conform to requirements of ADA and CBC.

1.03 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating complete layout, method of assembly and installation details.

B. Product Data: Submit manufacturer's catalog data for each item, including hardware.

C. Material Samples:

1. Submit full range of toilet partition manufacturer Samples of material chips for initial color selection. Chips shall be at least 2 inches x 3 inches.

2. Submit Samples of hardware and fasteners.

D. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.

E. Contractor to submit all maintenance data to District.

1.04 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: ASTM E 84 - Surface Burning Characteristics of Building Materials.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site with manufacturer's labels intact and legible, in sealed containers. Materials shall be kept dry.

B. Provide all means necessary to protect compartments and screens.

1.06 WARRANTY

A. Provide 10 year material warranty.

B. Provide an unconditional 2-year installation warranty commencing on recordation date of the Notice of Completion, per General Conditions.

C. A site review with a designated District representative is required prior to expiration of warranty as a condition to end installation warranty period.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Scranton Products
Santana/Comtec/Capitol
801 East Corey Street
Scranton, PA 18505
800-445-5148

2.02 SYSTEMS

A. Toilet Partitions: Flush type, floor-mounted, overhead-braced partitions.

B. Urinal Screens: Floor- and wall-mounted type.

C. Vision Screens: Floor- and wall-mounted type.

2.03 MATERIALS

A. Toilet compartments, panels, doors and pilasters shall be corrosion resistant, floor-mounted, overhead-braced:

1. Core: High Density Polyethylene

2. Fire Resistance: The panels shall have Class A Flame Spread Rating.

3. Single component construction of Solid HDPE in colors that extend from the surface throughout the core. Solid HDPE shall have NFPA Class A rating when tested utilizing ASTM E 84 Tunnel Test for flame spread, smoke generation and fuel contributed.

4. Color: Paisley.

5. Toilet Partitions to contain re-cycled content.

6. Partitions to include optional heavy-duty stainless-steel hardware with continuous wall brackets.

2.04 CHARACTERISTICS

A. Doors, panels and pilasters: 1 inch thick and edges machined to a radius of .250 inch.

B. Dividing panels: 58 inches high and mounted at 12 inches above finished floor.

C. Doors: 58 inched high and mounted at 12 inches above finished floor.

D. Pilasters: 82 inches high and fastened to 3 inches high (20 gauge stainless steel) shoes with theft proof cadmium plated torx sex bolts.

2.05 FABRICATION

A. Panels and door sizes as indicated on Drawings.

2.06 HARDWARE

A. Door hardware shall be aluminum:

1. Hinges: Fabricate from heavy aluminum extrusion with brite dip finish, wrap around flanges surface mounted and thru-bolted to doors and pilasters with one-way torx sex bolts, Factory set to stand open to the degree required. Accessible compartment doors shall be self-closing per 11B-604.8.1.2.

2. Each door for enclosures for the disabled shall be equipped with one door pull on each side, self-closing hinges and one wall stop. The inside and outside of the compartment door to disabled accessible compartment shall be furnished with a slide bolt door latch, U-shaped or wire pulls immediately below the latch. The latch shall be flip-over style, siding or other hardware not requiring flight grasping or twisting.

3. Door strike and keeper shall be fabricated from heavy aluminum extrusion brite dip finish with surface mounted and through-bolted to pilaster with one-way torx sex bolts. Slide bot and button shall be heavy aluminum with “Tough-Coat Black” finish.

4. Door latch housing shall be fabricated from heavy aluminum, surface mounted and through-bolted to door with one-way sex bolts.

5. Door hardware shall be mounted 30” to 44” above finished floor.

B. Hinges: Fabricate from heavy aluminum extrusion with brite dip finish, wrap around flanges surface mounted and thru-bolted to doors and pilasters with one-way torx sex bolts, Factory set to stand open to the degree required.

C. Furnish each door with (1) coat hook/bumper of heavy chrome plated Zamack with rubber bumper. Handicapped doors also included (1) door pull at each side and (1) wall stop.

D. Anchor pilaster shoes to finish floor with Plastic Anchors and #14 cadmium plated Phillips head screws.

E. Full length continuous wall brackets:

a. Full length continuous brackets shall be extruded brite dip. Brackets shall be available in single and double ear configuration.

b. Wall brackets: Thru-bolted to panels and pilasters with one-way sex bolts.

F. Headrail: Heavy Alloy aluminum extrusion with mill finish in anti-grip configuration. Fasten headrail to tops of pilasters and headrail brackets by thru-bolting with one-way torx sex bolts.

G. Headrail bracket: 20 gauge stainless steel.

H. Install additional bumper on outside of out swinging handicap access doors.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of partitions and screens shall be in accordance with manufacturer's instructions and recommendations as specified. Install straight, level and plumb.

B. No evidence of drilling, cutting or patching shall be visible in finished Work.

C. Fasten panel brackets securely to walls and ceilings with recommended anchoring devices.

D. Fasten panels and pilasters to brackets with through bolts and nuts.

E. Fasten urinal screen panels to walls with 2 panel brackets, and floor to ceiling mounted aluminum post.

F. Provide 1/2 inch spaces between wall surface and panels or pilasters.

G. Provide for adjustment of floor variations with non-breakable plastic shoes on pilasters. Conceal floor fastenings in pilaster shoes.

H. Furnish each toilet compartment door with top and bottom hinges, and door latch.

I. Install door strike keeper on each pilaster in alignment with door latch.

J. Furnish each toilet compartment door with one coat hook and bumper.

3.02 TOLERANCES OF INSTALLED WORK

A. Maximum Variation from Plumb or Level: 1/8 inch.

B. Maximum Misplacement from Intended Position: 1/8 inch.

3.03 ADJUSTING AND CLEANING

A. Hardware Adjustment: After installation, adjust hardware for proper operation. Install hinges on in-swinging doors to hold open approximately 30 degrees from the closed position when unlatched. Install hinges on out-swinging doors to return to the fully closed position. Adjust doors so that bottoms of doors are level with the bottoms of the pilasters when the doors are in the closed position.

B. Adjust and align door hardware to uniform clearance at vertical edges of doors. Clearance space shall not exceed 1/4 inch.

C. Adjust door hinges so that free movement is provided and will locate in-swinging doors in partial open position when unlatched. Return out-swinging doors to closed position.

D. Cleaning: Clean compartments, hardware, and doors before Substantial Completion and leave free from imperfections. Remove protective coverings.

3.04 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 10 2813

TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Toilet accessories.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 10 2113 - Plastic Toilet Compartments.

1.02 REGULATORY REQUIREMENTS

A. Comply with CBC Chapter 11B requirements and ADAAG recommendations for accessibility.

1.03 SUBMITTALS

A. Shop Drawings: Submit a schedule of accessories and Shop Drawings indicating installation methods and fasteners.

1.04 QUALITY ASSURANCE

A. Coordinate related Work as required to ensure proper and adequate provision in framing of backing and wall finish for installation of accessories.

B. Coordinate requirements of Section 10 2113 - Plastic Toilet Compartments to ensure that correct openings are provided in partitions for toilet accessories where required.

1.05 DELIVERY, STORAGE AND HANDLING

A. Protect accessories from damage.

PART 2 - PRODUCTS

2.01 GENERAL

A. Accessories shall be provided with necessary anchoring devices and fasteners appropriate for surfaces on which items are to be fastened.

2.02 MATERIALS

A. Grab Bars (B1, B2, B3): 1-1/2 inches diameter by 18 gage stainless steel tubing, of size and configuration indicated. Ends shall be screwed to 11 gage stainless steel wall plate, with snaplock cover flanges. Grab bars over 36 inches in length shall be furnished with stainless steel support at mid-point. Exposed stainless steel to be 180 grit satin finish. B- B-5806 x 36, B-5806 x 42 Series or equal.

B. Mirror:

1. (C): Surface Mounted, Mirror with stainless steel channel frame. Bobrick B-290 or equal.

C. Toilet Paper Dispenser:

1. (D): Surface Mounted, Type 304 stainless steel, satin finish. Theft-resistant toilet tissue spindles shall be removable only with special key provided. Bobrick B-4288 or equal.

2. (E): Recessed Dual Roll, Type 304 stainless steel, satin finish. Theft-resistant toilet tissue spindles shall be removable only with special key provided. Bobrick B-4388 or equal.

E. Liquid Soap Dispenser

1. (F): Surface Mounted, Bobrick B-2111 or equal.

F. Paper Towel Dispenser:

1. (G): Recessed Paper Towel Dispenser/Trash Receptacle, Type 304 stainless steel, satin finish. Bobrick B-3944 or equal.

G. Toilet Seat Cover Dispensers

1. (H): Surface Mounted, Type 304 stainless steel, satin finish. Bobrick B-4221 or equal.

H. Clothes Hook:

1. (J): Surface Mounted, Type 304 stainless steel, satin finish. Bobrick B-6827 or equal.

I. Utility Shelf with Mop/Broom Holders and Rag Hooks

1. (K): Surface Mounted, Type 304 stainless steel, satin finish. Bobrick B-239X34 or equal.

J. Sanitary Napkin Disposals:

1.

2. (N): Surface mount, Type 304 stainless steel, satin finish. Bobrick B-270 or equal.

3. (P): Recessed, Type 304 stainless steel, satin finish. Bobrick B-353 or equal.

3.01 EXAMINATION

A. Check openings in substrates to receive accessories. Verify openings are correctly located and sized to receive accessories, and that locations will comply with disability access requirements. Confirm that blocking, backing or support is properly located and adequate for the accessory installation.

B. Verify spacing of plumbing fixtures and toilet partitions. Confirm spacing and locations are compatible with proposed accessory locations and will allow compliance with disability access requirements.

3.02 INSTALLATION

A. Install toilet accessories in accordance with manufacturer's written recommendations and accessibility requirements. Fasten components firmly in place.

B. Drill holes to correct size and application that is concealed by item with ¼ inch tolerance.

C. Install recessed accessories into wall openings with sheet metal screws into metal frames.

D. Install surface-mounted accessories to backing plates with machine screws, plumb, and aligned.

E. Grab Bars:

1. Fasten to toilet partition with 3-inch diameter stainless steel back plates with studs, couplings, and stainless steel machine screws.

2. At wood stud walls, fasten wood blocking with threaded stainless steel wood screws of sufficient length to penetrate blocking 1 ¼-inch minimum.

3. At metal stud walls, provide 1/8 inch cold-rolled steel plate, drilled and tapped for machine screws, or 16 gage cold-rolled steel plate complete with threaded sleeves for stainless steel machine screws. Weld plates to studs.

4. At concrete or masonry walls, install bars with sheet metal screws and expansion anchors.

5. At plaster or gypsum board walls, provide spacers of same thickness as wall material to prevent crushing of wall material.

F. Mirrors: Install mirror on manufacturer supplied concealed wall hanger and fasten with two theft-resistant locking screws.

G. Before Substantial Completion, deliver keys and maintenance instructions and product data to OAR.

3.03 ADJUSTING AND CLEANUP

A. Adjust accessories for proper operation.

B. Remove rubbish, debris, and waste material and legally dispose of off the Project site.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 10 4413

FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of General Conditions, and Division 1 - General Requirements apply to this section.

B. Section includes fire extinguishers and fire extinguisher cabinets.

1. Provide number of fire extinguishers and cabinets as indicated on floor plans. Minimum four per floor for each building, unless more are indicated on plans.

2. Provide one fire extinguisher and cabinet in each elevator machine room.

C. Related Sections:

1. Section 09 2900 Gypsum Board.

1.02 SYSTEM DESCRIPTION

A. Regulatory Requirements:

1. Units shall be UL rated for appropriate class and local Fire Department and State Fire Marshal approved.

2. Selection and installation to be in accordance with California Fire Code (CFC), CCR Title 19, and NFPA 10.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Installation Instructions: Submit manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

A. Provide units manufactured by one manufacturer:

1.05 WARRANTY

A Provide an unconditional 2-year installation warranty commencing on recordation date of the Notice of Completion per General Conditions, Article 3.4, in addition to the manufacturer’s standard warranty.

B. The Contractor shall perform a site review with the designated District Representative prior to the expiration of warranty as a condition to end installation warranty period.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fire Extinguisher Cabinets: Potter-Roemer Alta Cabinet with duo vertical panel and vertical letter work recessed cabinet steel color as selected by Architect, or acceptable equal. Size of cabinet shall accommodate the required size of the fire extinguisher. See drawings for additional information.

1. Cabinet Box: 18 gauge painted steel frame, factory white finish. Model 7007- DVL Recessed

2. Door and Exposed Trim: 18 gauge steel with factory white finish, one piece construction with full break glass with break-away acrylic panel.

3. Door Hardware: Continuous type stainless steel hinge and lock.

4. Construction: Welded joints, ground smooth.

B. Fire Extinguishers: Sizes and rating types as required by local Fire Department and State Fire Marshal. Multi-Purpose dry chemical Type - 5 lb., 2-A-10-B: C and Type K.

Labs with hazardous materials shall have 20 BC & 40 BC rated fire extinguishers.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall be in accordance with manufacturer's recommendations.

B. Cabinets shall be installed plumb and level, where indicated on Drawings, at heights required by authorities having jurisdiction.

3.02 PROTECTION

A. Protect the Work of this section until Final Completion.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 11 6133

THEATRICAL RIGGING

PART 1 - GENERAL

1.01 SUMMARY

A. This specification section includes the engineering, fabrication, furnishing, delivery and installation of new stage rigging equipment and drapery as specified in the 'Products' specifications and as indicated on the related rigging and drapery drawing documents for the auditorium stage.

B. Contract Documents and General Requirements apply to the work of this Section.

C. The General Contractor must submit the name of its selected Theatrical Rigging Contractor at the time of bid.

D. All bidders shall fully inform themselves of the conditions under which the work is to be performed. No additional compensation shall be allowed for any labor or item the bidder could have been fully informed of prior to the bid date.

E. While the components, quantities, and arrangements described herein and shown on the drawings indicate specific details for the realization of the stage systems, bidders may propose alternate details and components which will fulfill the functional parameters of the envisioned system. In such event, bidders shall submit a complete set of specifications and drawings, not less detailed than these and following the same general outline, together with a detailed statement indicating paragraph by paragraph wherein the equipment to be offered deviates from specifications included in this bid request. Where alternate proposals are offered they shall be submitted with the amount to be added or deducted from the base bid which is required from all bidders.

1.02 SCOPE OF WORK

A. Work shall include the installation of all new materials and equipment necessary for the proper operation of all rigging and drapery equipment. Contractor shall furnish qualified personnel to test and adjust the equipment after installation until specified performance is attained.

B. Preparation and submission of complete engineered shop drawings for approval by the Architect and Theatre Systems Consultant.

C. Verification of conditions and dimensions at the job site.

D. The adjustment and testing of the completed installation by the contractor's personnel, subject to Architect and Theatre Systems Consultant's approval.

E. Submission of required record documents.

F. Coordination with other affected work, trades, and inspections.

G. Installation work includes, but is not limited to the following:

1. New counterweight system T-bar guide rails and related supporting hardware.

2. New stage rigging lockrail, rope locks, and hand lines.

3. New index light, outrigger brackets & pipe batten at stage level.
4. New counterweight arbors and counterweights.
5. New head blocks, loft blocks, tension blocks, and mule blocks.
6. New winch control equipment.
7. New stage batten pipes and related wire rope hardware.
8. New drapery curtains.
9. New drapery curtain traveler tracks and related hardware.
10. New lighting batten connector strips and related support straps. Connector strips and straps to be provided per Theatrical Lighting specification section.
11. New stage lighting multiconductor circuitry cables for stage lighting batten pipes. Multiconductor cables to be provided per Theatrical Lighting specification section.
12. New stage lighting batten cable cradles.
13. New re-mountable pipes and mounting hardware for auditorium box boom lighting positions.
14. New spot block rope.
15. Supporting brackets, clips, drilled anchors, miscellaneous iron supports, and supplemental steel where required for installation of the work of this Section and not furnished under other Sections.
16. Safety and operational instruction signs for all rigging equipment which is installed.
17. All scaffolding, hoisting equipment, tools, etc. necessary to perform the work.

1.03 RESPONSIBILITY

A. Thoroughly review the current Architectural, Structural, Mechanical, Electrical, and other Project related drawings prior to submitting the bid proposal.

B. Organize and program the Work of the Section to harmonize with the work which will be performed by other contractors during the Project so that work will proceed as expeditiously as possible.

C. Organize and program the Work of the Section to harmonize with the work which will be performed by other contractors during the Project so that work will proceed as expeditiously as possible.

D. The design, engineering, fabrication, installation, and coordination of systems and associated components specified in this Section are the contractor’s responsibility.

E. Comply with all applicable code requirements and the requirements of federal, state, and local authorities having jurisdiction over the design, fabrication, installation, and operation of the systems and associated components specified in this section.

F. Take full responsibility for the proper placing and fitting of equipment and materials furnished under this Section into the structure.

G. Design components and install equipment to fit into the structure as built.

H. Specifications only establish criteria and do not attempt to dictate specific installation details and methods which may be necessary for the successful contractor’s design; drawings related to the Work of the Section may therefore be diagrammatic.

I. Become familiar with the building construction and finishes, access and space available for equipment, and obvious interferences requiring special attention.

J. Carefully check and verify pertinent dimensions, sizes, loads and the appropriateness of structure supporting the proposed Work of this Section, both on the Drawings and in the field, before proceeding with any work.

K. Provide additional structural and support members and guards as necessary for proper installation and operation of the Work of this Section.

L. All variations from specified equipment must be approved in writing by the Architect and Theatre Systems Consultant.

M. All rigging equipment and hardware must be of new and recent manufacture.

N. All components utilized in the stage rigging equipment shall be specifically recommended by their manufacturer or trade organization for rigging applications. They shall be installed and used in accordance with the manufacturer's specification. All load-rated hardware must be appropriately marked and of domestic U.S. manufacture.

O. Design and engineer equipment, devices, machinery, and systems based upon the following:

1. Safety to personnel during operation, use, and maintenance.
2. Adequate strength.
3. Proper coordination of systems and elements, including impact strength, breaking strength, emergency stopping distances, acceleration and deceleration rates, and normal working stress capabilities of equipment and components.
4. Reliability, with consideration for special or unusual requirements of the unit or installation.
5. Ease of maintenance.
6. Coordination with associated and adjacent systems provided under other Sections.

P. Omissions: Where dimensions and loading capacities have been omitted from this specification, they are to be determined by the bidder in accordance with accepted industry standards and the guidelines in this section. In no way shall the Contractor be relieved of the primary responsibility to provide a safe, fully functional system.

Q. Insurance: In the absence of more stringent requirements, the Contractor shall maintain injury and property liability insurance coverage throughout the project’s scheduled timetable, including workmen’s compensation coverage for Contractor’s employees. At no time throughout this project will the School District be liable for any damage, loss or personal injury claims arising out of the negligence of the Contractor.

1.04 CODES, LABELS, AND STANDARDS

A. All rigging equipment and installation methods must conform to current CBC California Building Code rules and all local codes and ordinances.

B. A manufacturer's label shall be conspicuously and permanently attached to each piece of rigging equipment. Chain, rope and wire rope are exempt from this requirement.

C. Visible and permanent system capacity information shall be displayed at a location which is easily seen by the operator.

D. Those parts of the rigging equipment which require lubrication and maintenance shall be safely and easily accessible and serviceable. The name and type of the lubricant shall be conspicuously displayed near lubrication points. Lubrication points shall be conspicuously marked.

E. Critical instructions for the rigging equipment shall be visibly mounted within view of the operator. Such instructions shall be brief and concise.

F. Conform to the applicable requirements of the current adopted editions of the following reference codes or standards:

1. Occupational Safety and Health Act.
2. Occupational Safety and Health Standards.
3. California Building Code.
4. Code for Welding in Building Construction.
5. Life Safety Code.
6. American Iron and Steel Institute (AISI).
7. American National Standards Institute (ANSI).
8. American Welding Society (AWS).
9. United States Institute for Theatre Technology (USITT).
10. Entertainment Services & Technology Association (ESTA).

1.05 QUALIFICATIONS

A. Provide the Work of this Section under a single Contractor widely experienced in the design, manufacture, and installation of theatrical rigging equipment, hardware, and draperies of the quality and complexity specified in this Section.

B. Contractor shall have been actively engaged in the theatrical rigging and drapery business for at least the past 5 consecutive years.

C. Bidders must be licensed and legally qualified as a California construction contractor at the time of bidding.

D. Maintain a competent Supervisor, acceptable to the School District and the Architect, during the entire installation. Change of Supervisor during the Project is not acceptable without prior written approval from the School and the Architect.

E. Employ only experienced theatrical stage riggers on the Project.

F. Employ only certified welders, if welding is required.

G. Employ only experienced drapery sewers under the supervision of a drapery workroom Supervisor having at least 5 years experience in the production of draperies of the types specified in this Section.

1.06 SUBMITTAL DRAWINGS

A. Shop drawings shall be a single, integrated set of drawings produced by a single company on a common titleblock and with consistent drafting conventions through the entire set of drawings. Dates and notations for drawing revisions shall be consistent throughout all drawings and shall be located in the same location on common titleblocks.

B. No references shall be made to “work by others” or “supply by others” for items that are part of the scope of work for this section.

C. Shop drawing shall be submitted on minimum 24”x36” size sheets. Equipment data sheet submittals shall be on letter-size paper and when multiple items are on a single page the item being proposed shall be identified clearly by an arrow, box, or other method.

D. Shop drawing submittals shall include the following drawings in addition to equipment data sheets:

1. Cover sheet with complete index of drawings, identification of Project, Architect, General Contractor, Consultant, and complete Rigging Contractor contact information including name and phone number for Rigging Contractor’s project manager.

2. Stage rigging plan(s) indicating lineset placement and dimensions for all suspended rigging, operable or fixed. Minimum scale of ¼” = 1’-0”. Identify all linesets with number, function, and distance from plaster line.

3. Stage rigging section indicating all linesets by type and including illustrations of curtains, lighting battens, and other elements with cross section greater than a single pipe batten. Include indications of high and low trims for all variations on operable linesets. Minimum scale of ¼” = 1’-0”. Identify all linesets with number, function, and distance from plaster line.

4. Stage rigging elevations for general purpose pipe battens, lighting battens, operable curtains including all traveler track & pipe batten hardware, projection screen, and any other variations of manual or motorized rigging. Include batten attachment detail references for all lineset types. Minimum scale of ¼” = 1’-0”.

5. Schedule(s) for stage rigging elements including batten lengths & types, arbor sizes & capacities, track types and sizes, curtain types and sizes, placement relative to a known datum reference.

6. Details of all individual rigging elements including but not limited to:

a. Pipe battens, batten splices, all batten and arbor cable termination methods, batten marking methods.

b. All types of rigging blocks, counterweight arbors, countwerweights, lockrail & rope lock, outrigger brackets, tee or j-bar wall details including all supports.

c. All motorized winch details, motor and control wiring enclosures, motor and control wiring details and schematic diagrams.

d. Traveler tracks and related hardware, curtain fabrication instructions.

e. Attachments of rigging elements to building structure.

1.07 PERMITS AND INSPECTIONS

A. Obtain and pay for required permits for and inspections of work of the Section.

B. Furnish material and work under this Section which meets or exceeds applicable legal and code requirements.

C. Perform tests required by the Architect, District Representative, and authorities having jurisdiction.

1.08 SAFEGUARDS AND PROTECTION

A. Provide suitable barriers and warning signs associated with or adjacent to stage rigging and drapery installation wherever necessary for the protection or safety of workers on the Project, School's personnel, and others, both during construction and after completion of the Work of this Section. Maintain barriers and warning signs during installation of the Work of this Section.

B. Provide guards and guides at structural edges and corners and surrounding moving equipment as necessary to prevent fouling or tearing of draperies or rigging by structure, other rigging, or personnel contacts.

C. Protect materials and equipment from dirt and damage. Cover materials until just before the completion of the Project to prevent the adhesion of foreign matter or unintended paint.

D. Replace damaged or defective work or material prior to final payment request.

E. Take full responsibility for loss or injury to persons or property resulting from neglect of the above precautions.

1.09 DELIVERY AND STORAGE OF MATERIALS

A. Contractor is responsible for scheduling and timely delivery and placement of items furnished under this Section.

B. Deliver equipment and other material to the jobsite in crates, bundles, bags and drums.

C. Clearly identify on each container the item name, size, and intended use.

1.10 SPARE PARTS

A. Provide spares, spare parts and special tools for all rigging equipment if necessary for proper operation and maintenance of equipment.

1.11 OPERATIONS AND MAINTENANCE DATA

A. Verbal Instructions: Instruct the School's designated operating personnel in the operation and maintenance of all systems.

B. Inspections: Make a minimum of two inspections with operations personnel, within the guarantee period, at no expense to the School, to insure all systems to be in satisfactory operating condition. Submit written report signed by operating personnel witnessing inspection to the School indicating inspection results with copies to the Architect and Theatre Systems Consultant.

1.12 COMPLETION

A. Before operating any equipment for demonstration or test, comply with manufacturer's preparation instructions.

B. After checkout and adjustment, the rigging systems shall be operated for approval of the School, Architect, and Theatre Systems Consultant.

C. The contractor shall provide a minimum of four (4) hours of operations and maintenance instruction for the School's staff. This is to be coordinated with the School's schedule.

D. If due to installation-caused matters the Architect or Theatre Systems Consultant is required to perform any follow-up checkout or inspection visits after the approved completion of the project, the Contractor shall compensate the Architect or Consultant at their standard hourly rates for all time expended.

1.13 GUARANTEE

A. Guarantee all material, rigging equipment and work for a period of two years from written acceptance of the work, against defects of any kind.

B. Parts Warranty: Obtain guarantees and/or warrantees for factory assembled equipment and include with 'Operations and Maintenance Data.'

C. Replacement: In the event of failure of any work, equipment, or device during the life of the guarantee, at no cost to School, repair or replace the defective work and remove, replace or restore any parts of the structure or building which may be damaged as the direct result of the defective work or in the course of making the replacement of defective work or materials. Any work, equipment or device replaced due to failure shall be guaranteed for a period of 2 years from date of replacement.

D. The Contractor shall provide field service maintenance, at no cost to the School, within 24 hours of notification of system malfunction. This service response shall be in effect for a period of 24 months after School's acceptance of the system.

1.14 INSURANCE

A. Provide full insurance against loss or damage during equipment shipment, storage, installation, and testing.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide only materials which are new and of first quality.

B. Use only load-rated hardware of domestic U.S. manufacture.

C. Receive from the Architect approval of design, materials, and components prior to fabrication.

D. Substitute Materials: In no case shall materials of lesser design or workmanship be deemed acceptable. Any Contractor proposing to use a substitute material or item of equipment must guarantee the suitability of the recommended substitution and provide appropriate manufacturer's literature, catalog information, cut sheets and product data sheets sufficient to permit the architect or engineer to make a meaningful and informed decision to accept the substitution. All such requests must be made at least ten days before the bid opening date. Approval of substitute equipment shall be made by addenda prior to the bid opening date.

E. Omissions: Where dimensions and loading capacities have been omitted from this specification, they are to be determined by the bidder in accordance with accepted industry standards and the guidelines in this section. In no way shall the Contractor be relieved of the primary responsibility to provide a safe, fully functional system.

F. All electrical equipment to be listed by Underwriters Laboratories (UL), the Electrical Testing Laboratories (ETL), or other recognized independent testing organization and bearing the organization's listing mark.

G. Construct and install equipment so that when the equipment is operated the sound pressure levels are minimal.

2.02 GUIDE TRACKS

A. Guide tracks shall be fabricated and installed to provide a series of vertical guide slots to contain the guides or shoes mounted on the counterweight arbor. They shall permit the arbors to travel vertically while preventing any lateral or twisting motions. The standard guide track system shall consist of guide bars mounted parallel to each other and rigidly fastened to horizontal wall battens. The minimum spacing of the guides and the tolerance or play between the guides and guide shoes shall be such that it is impossible for counterweights in adjacent arbors to come in contact with each other under any conditions.

B. Guide tracks shall be extruded aluminum, anodized in a black color, or shall be steel Tees.

C. Guide tracks should be attached to steel angle horizontal wall battens which are located at right angles to and behind the guides, using clips and nuts and bolts. The welding of guides is not permitted so that they can be easily replaced in case of damage. The wall battens must be rigidly supported so that the guides cannot move front to back or side to side.

D. Guides shall be installed so they are plumb.

E. Guide tracks shall be spaced on 6" or 8" centers. Install a complete battery of guide tracks from the house curtain guide track to the furthest upstage lineset. No gaps shall be allowed for space where linesets are not specified.

F. Stop battens shall be attached to the guide tracks to limit the travel of arbors at the top and bottom of the track. Stop battens shall be minimum 2" x 2" hardwood with neoprene padding securely fastened to the stop batten. Stop battens shall be attached to the guide track with 2"x2"x1/4" steel angle. They shall be strong enough to limit the travel of arbors under normal operating conditions. In the event of an uncontrolled arbor impact, a stop shall yield in a manner that will decelerate the arbor to a stop with a minimum of damage to adjacent equipment or injury to operating personnel.

2.03 COUNTERWEIGHT ARBORS

A. New counterweight arbors shall be single purchase with two vertical structural members mounted on 10" centers to accommodate a standard counterweight. Spreader plates shall be permanently installed so they slide freely up and down the arbor tie-rods. Spreader plates shall be designed to prevent the arbor tie-rods from spreading apart in the event of an impact. There shall be one spreader plate for every two feet of arbor height, one to be placed above the dead-load counterweights, and one more for the top of the weight stack. Each arbor tie rod shall have a locking collar above the uppermost spreader plate. When tightened, it shall prevent the counterweights from being lifted out of the arbor. Loosened, it shall travel freely up and down the arbor tie-rod. No tools shall be required to tighten or loosen the locking collar. All fasteners shall be Grade 5 or better and shall have lock nuts or lock washers to prevent loosening in operation.

B. The bottom of the counterweight arbor frame shall be configured so that there is a flat surface on which the counterweights rests without rocking and without coming into contact with any bolts, nuts or other fasteners.

C. The arbor frame shall contain guide shoes for engaging tee guides. Guide shoes must ride freely, engage the track in a manner that prevents them from disengaging under any usage, and should be as quiet and friction free as possible.

D. The counterweight carriages shall be marked in such a way as to indicate the appropriate locations of spacer plates during the loading process.

E. Paint the edges of the dead load counterweight red.

F. Provide lineset number at top and bottom face of each arbor with 1-1/2” high white numbers on black background.

G. See Theatre Systems Consultants drawings for arbor size and load capacity for each lineset.

2.04 COUNTERWEIGHTS

A. Counterweights shall be sized appropriately for the arbors which are supplied, with U-shaped cutout for the arbor rods. Counterweights shall be flame or laser cut steel. All edges shall be ground free of slag and burrs. The thickness of counterweights shall not vary more than 1/8” from nominal dimension. All counterweight supplied shall be nominally 6" wide for arbors on 8” centers or 4” wide for arbors on 6” centers.

B. Opposite corners shall be chamfered 1” x 1” at 45-degree angle for ease of handling. Alternate weights when stacking to provide finger holds when loading arbors.

C. Furnish and install new counterweight sufficient to balance the installed loads on each batten pipe including dead load, connector strips, mulitcable for connector strips, stage drapery curtains and curtain traveler tracks.

D. See project drawings for total quantity of counterweight to be supplied.

E. Provide 100% of the counterweight supplied nominally 1” thick.

F. Place 100% of the extra counterweight on the loading gallery floor.

2.05 PIPE BATTENS - GENERAL PURPOSE LINESETS

A. New pipe battens shall be fabricated from full joint lengths of new 1-1/2” I.D. std. pipe, straightened, stripped and painted. All pipe joints shall be by means of bolted 18” internal sleeves. Threaded pipe couplings shall not be acceptable.

B. Paint a 1 inch wide stripe white at the centerline of the pipe. Cap pipe ends using yellow hemispherical plastic or neoprene rubber bumpers.

C. All general purpose linesets including those designated for drapery curtains and projection screens shall attach to the lift lines by means of a 1/4" plated, grade 30 proof coil trim chain wrapped one and one half turns around the top batten and attached back to the thimble at the end of the lift line with a 5/16" forged shackle. Trim chains shall be 36" long and shall be terminated at the stage end of each lift line.

2.06 STAGE LIGHTING ELECTRIC LINESETS

A. Stage lighting electric linesets shall consist of an upper pipe batten, a stage lighting dimmer-circuit connector strip, connector strip mounting brackets, lower pipe batten, flexible multi-conductor cable(s), cable cradle(s), and Kellems-grip strain relief's for both ends of the multi-conductor cable. The stage lighting connector strip shall be supported

between the upper and lower pipe battens by hanger bracket assemblies. New pipe battens shall be fabricated from full joint lengths of new 1-1/2" I.D. schedule forty black iron pipe, straightened, stripped and painted. All joints shall be spliced with 18" long sleeves with 9" extending into each pipe and held by two 3/8" hex bolts and lock nuts on each side of the joint. Threaded pipe couplings shall not be acceptable.

B. Paint a one-inch wide stripe white at the centerline of the pipe. Cap pipe-ends using yellow hemispherical plastic or neoprene rubber bumpers.

C. Stage lighting electric linesets shall attach to the lift lines by means of a turnbuckle and pipe clamp attached to the top pipe batten. The lift line shall terminate with a copper Nicopress sleeve and thimble. Secure the turnbuckle from rotation after a load has been applied and the batten has been leveled.

D. The multiconductor cables shall be supported at 1 or 2 intermediate points along its length via cable cradles. Arrange the cable cradles and cradle lift lines such that maximum travel is obtained for the lineset and to reduce the chance of the cable loop dropping below the connector strip. Provide a separate lift line for the cable cradle(s).

E. The multiconductor electrical cables shall be securely attached near the ceiling junction box to support the weight of the cable and reduce the bending radius at cable entry point. Kellems support grip strain-relief devices shall be used for each cable.

F. The multiconductor electrical cables shall be securely attached near the connector strip entry point to reduce strain on the cable and to reduce the bending radius at cable entry point.

G. The following electric lineset components shall be supplied and installed by the rigging contractor:

1. Upper and lower pipe battens, pipe clamps, turnbuckles.
2. Cable cradles and associated rigging hardware.
3. Lift lines and all wire rope termination hardware.
4. All other portions of the lineset including but not limited to: loftblocks, rigging winches.

H. The following shall be supplied by the electrical contractor and installed by the rigging contractor:

1. Stage lighting connector strip.
2. Connector strip mounting bracket assemblies to support the strip at minimum 5'-0" O.C.
3. Multiconductor cable(s) necessary to feed dimmer circuits from ceiling junction boxes.
4. Kellems-grip strain relief devices to carry the vertical load of the mulitcable and to prevent severe bending of the mulitcable at both ends of the cable.
5. Ethernet cables with Ethercon connectors at each end for extension of stage lighting network from gridiron control receptacle stations to stage lighting connector strip.

2.07 MOTORIZED COUNTERWEIGHT ASSIST RIGGING

A. Furnish and install motorized counterweight winches to raise and lower the stage lighting battens.

1. Each winch shall operate the arbor at a fixed batten speed of approximately 20 feet per minute.

2. Winch system shall have, as a minimum, 1,000 lb. lifting capacity or 75% of the total arbor capacity; whichever is greater.

3. Winch system shall provide for soft-starts and soft-stops under normal operation to prevent un-necessary impact to lighting battens and to reduce dynamic loading on the building structure. Soft starts and stops shall be accommodated via programmable solid-state ramping.

B. Gear Reducer

1. The reducer shall be a combination right angle helical work gear reducer.

2. Reducer shall have a minimum service factor of 1.0.

C. Frame

1. The winch frame shall be constructed of structural steel members, compactly designed to support the winch components and load in a minimum amount of space.

2. Structural support shall be securely mounted to the floor below the arbor assembly meeting or exceeding the safety factor shown in Part 2.

3. A chain idler sprocket, as required, will deflect chain around arbor to prevent contact with any part of the system.

D. Brakemotor

1. The AC brakemotor shall be 1725 RPM, three-phase, 60 Hz with an integral brake.

2. The integral brake shall be sized to stop and hold the moving load within four inches. Brake shall automatically be applied in case of power failure.

3. A high inertia flywheel is required.

4. Motor shall have 1.0 service factor.

5. Verify available voltage.

E. Motor Control Center (MCC)

1. Each fixed speed winch shall be controlled by a factory wired and tested motor drive unit and industrial grade automation CPU built in accordance with UL Standard 508. Enclosure shall be NEMA 1 with a hinged latching cover. The motor drive unit shall be sized to match the winch motor horsepower and shall be rated for plugging and jogging.

2. In addition to the motor drive circuitry, a separate line contactor shall be provided. This contactor shall be controlled by the E-stop and over-travel limit switches, providing a separate means of removing power from the winch.

3. A spring return toggle switch shall be housed inside the starter cabinet to allow override of the overtravel limits for resetting purposes.

4. The enclosure shall have a through the door disconnect.

5. Provide local push buttons for up/down operation. The push buttons shall require continuous pressure to operate the set.

6. Each motor drive assembly shall be provided with properly sized fuses (per ULC 198C guidelines) or circuit breakers for primary motor protection. Provide a control circuit transformer rated at not less than 50VA with properly sized primary and

secondary fusing. Properly labeled, screw clamp terminals shall be provided for all field connections, including limit switches and other peripheral devices.

F. Limit Switches and Encoders

1. Each winch shall have an adjustable four-element rotary limit switch that stops the winch at the upper and lower normal limits of travel as well as for upper and lower over-travel protection.

2. Position encoders shall be incorporated with each winch and connected to the MCC to allow for repeatable preset position recording and recall and position feedback via graphic display if featured in the system.

G. Chain Sprocket

1. Sprocket shall be size and pitch matched to double roller drive chain.

2. Sprocket hub shall be keyed directly to the output shaft of the reducer.

H. Slack Chain Idler

1. The idler shall be designed to maintain maximum chain contact with drive sprocket in both directions of arbor travel.

2. Idler assembly will be designed to shuttle to tensioned side of chain.

I. Drive Cable

1. Drive cable(s) shall be a 1/2" 6 x 39 extra flexible IWRC (minimum.)

2. Cable connections shall conform to best practices.

3. Minimum bending radius, as recommended by the manufacturer, shall be maintained.

J. Drive Chain Connections

1. Chain to cable connection shall allow the cable to pivot around its axis to prevent chain rotation.

2. Chain to cable and chain to arbor connection shall maintain 100% of the chain strength capacity.

K. Headblock

1. Headblock shall conform to the specification listed.

2. A separate sheave for the drive cable may be used. Sheave shall have bearings rated for safe and reliable operation under the maximum design load.

L. Control Stations

1. Provide individual, UL Listed, NEMA 1 control enclosures that contain raise and lower push buttons, (2) preset pushbuttons, a record preset pushbutton, and a red mushroom head, push-pull emergency stop switch for each winch.

2. All push buttons that initiate movement shall require continuous pressure to operate the set.

3. Provide a key switch at each control station to prevent unauthorized personnel from operating the system. Power and fault indicator lights shall be mounted to the control panel face.

4. Typical operation would be to turn on power and press raise or lower pushbutton for direction of travel to manually move the linesets. Pressing and holding either

preset pushbutton would move the lineset to its pre-recorded position. Presets would be set by holding the record pushbutton and then pressing either of the two preset pushbuttons.

5. The winches shall be programmed for slower movement as they leave or approach their target presets for optimal accuracy and to reduce impact on the rigging system and building structure.

6. An emergency stop push button at any winch shall disconnect all power to the entire system and halt operation at any position.

7. Control panels shall be mounted to the stage rigging lockrail in-line with the lineset they control. Control panels shall not protrude past the onstage edge of the lockrail or interfere with manual operation of adjacent linesets.

2.08 HEAD BLOCKS

A. The head blocks shall be appropriately sized to accommodate the flying linesets, 8" O.D. minimum. They shall be either a Nylatron casting or ASTM Class 30 grey iron sheave with machined grooves. The sheave shall have sealed precision ball bearings or tapered roller bearings, 10 gauge side plates which fully enclose the sheave, bolted side plates, six spacers between the side plates, four of which to prevent cables from escaping the sheave grooves, and equal pitch diameter on cable grooves for smooth operation. Mounting clips shall be provided for proper attachment to the existing head block. Provide tie-offs for attachment of double purchase cabling components.

B. The housing assembly shall be designed to withstand compressive loads and to prohibit any bending or buckling of the side plates and mounting base.

C. The mounting of the head blocks shall prevent movement of the block and loosening of the block or mounting with time under load and vibration. All bolts shall be rated for the imposed design loads and all nuts shall employ locking washers or be of a self-locking variety.

D. In cases where head beams are not within 1-degree of being level, provide pivoting head block assemblies to keep lift line fleet angles less than 1 degree.

E. Verify clearance between top of head beam and bottom of ceiling to assure that head block will fit in available space.

F. Head blocks with diameters larger than 12" shall utilize a diverter block or auxiliary block for the handline to keep handline from contacting headbeams and edges of galleries.

2.09 LOFT BLOCKS

A. New loft blocks shall consist of a housing which encompasses an 8-1/2" O.D. minimum sheave with sealed bearings, a shaft which is locked against rotation in the housing, spacers which help to strengthen the housing and which prevent the cable from escaping from its groove, and provision for mounting the assembly to the supporting structure securely and accurately. All nuts shall be of a self-locking design or shall be equipped with lock washers. All nuts and bolts shall be Grade 5 minimum and sized for the imposed design loads with service factors. Mounting clips shall be properly sized for the load and mounting conditions. Clamping bolts must be properly torqued to prevent bolt loosening or block slippage.

B. All loft blocks shall include idlers with the appropriate number of sheaves to keep lift lines between blocks from sagging.

C. The block and associated mounting hardware shall have a minimum recommended working load of at least 500 lbs, and shall be designed for upright usage.

D. In cases where loft beams are not within 1-degree of being level, provide pivoting loft block assemblies to keep lift line fleet angles less than 1 degree.

2.10 TENSION FLOOR BLOCKS

A. New blocks shall consist of a housing which encompasses a 12” O.D. sheave with sealed bearings, a shaft which is locked against rotation in the housing, spacers to strengthen the housing and which prevent the ropes from escaping from their groove and provision for mounting the assembly to the supporting structure securely and accurately. The block shall be designed to carry the resultant load imposed by the rope wrapping around the sheave. The tension block must be able to withstand the allowable out of balance condition of the counterweight set. All nuts shall be of a self-locking design or shall be equipped with lock washers. All nuts and bolts shall be Grade 2 minimum and sized for the imposed design loads with service factors.

2.11 CABLE FITTINGS

A. Cable clips when used shall conform to wire rope manufacturer’s recommendations as to size, number, and method of installation. Clips shall be drop forged Crosby or approved equal. Under no circumstances may malleable cable clips be used in suspension or lifting lines.

B. Swaged sleeve fittings shall be copper Nicopress. Swaged fittings shall be installed per the fitting manufacturer’s instructions, using the appropriate tools, and checked with a ‘Go - No Go’ gauge.

C. Eyes shall be formed over heavy pattern, galvanized wire rope thimbles of correct sizes.

D. Turnbuckles shall be drop forged and galvanized. Turnbuckles shall be moused after adjustment to prevent loosening.

2.12 TRIM CHAINS

A. Trim chains shall be 36" long, made of 1/4" plated, grade 30 Proof Coil chain. Connection between the end link and the lifting cable shall be made with a thimble and copper Nicopress sleeve. Chains shall be wrapped one and one half turns around the batten and attached back to the thimble at the end of the lift line with a 5/16" forged shackle. Adjustment is made by connecting the shackle into a link along the return side of the chain.

B. Trim chains shall have a recommended working load of at least 750 lbs.

2.13 LIFT CABLES

A. All lift cables shall be 7 x 19 construction, small diameter galvanized specialty cord, ASTM 1023, sized as required for minimum safety factor of 8, and with breaking strengths as follows:

1. 1/8" diameter - 2,000 pounds
2. 3/16" diameter - 4,200 pounds
3. 1/4" diameter - 7,000 pounds
4. 5/16" diameter - 9,800 pounds
5. 3/8" diameter - 14,400 pounds

B. Damaged or deformed cable shall not be used. All wire rope rigging shall be installed so as to prevent abrasion of the wire rope against any part of the building construction or other equipment.

2.14 PURCHASE LINES

A. The purchase lines shall be protected from bending and abrasion at the eye by a properly installed and appropriately sized, heavy pattern oval or round thimble. The purchase lines shall be terminated with two half-hitches or a knot or splice of at least equal effectiveness. The tail of rope left after the knot shall be attached to the purchase line so as not to foul or jam adjacent line sets or equipment. The ends of the purchase lines shall be prevented from fraying or unraveling.

B. The purchase lines shall be 3/4" 'Multiline II' rope manufactured by New England Rope or approved equal.

2.15 LOCKING RAIL

A. The locking rail shall support the rope locks and the index cards used to identify the line sets. The rail shall be constructed to withstand a 300-pound per linear foot up load. The locking rail shall be drilled to receive rope locks at intervals of 8 inches. The locking rail shall run the full width of the TEE-bar guide track wall.

B. The railing shall be attached by the appropriate bolts, anchors, or by welding as needed to transfer the required loads to the building structure with a full safety factor and without loosening due to vibration or use of the rope locks.

C. Provide rope locks for securing purchase lines at lock rail.

1. Rope lock housing shall be cast from ASTM A536 Class ductile iron. Mount two eccentric jaws with 1/4" diameter grade 5 bolts and lock nuts inside housing with minimum 5/16" wall thickness. Provide nylon and steel wave washers to minimize jaw chatter. Jaw pressure adjustment on offstage jaw shall be provided by a 3/8" diameter nylon-tipped socket head cap screw with jam nut.

2. Provide 9" long rope lock handle with eccentric base to provide locking action to onstage jaw. Fabricate handle from 9/16" steel plate and encapsulate with plastisol to a thickness of .025"-.030". Provide a neoprene bumper embedded into rope lock housing to cushion and silence handle in unlocked position. Supply welded oval steel ring, plastisol coated, to keep handle from accidentally unlocking.

3. Body of rope lock shall include provisions for attachment of safety lockout tag or 3/8" shackle padlock to prevent unauthorized use of system. The rope lock shall mount to the locking rail with four 3/8" hex bolts and lock nuts.

D. The locking rail shall be provided with numbered, plastic write-on erasable index cards. All cards should indicate the lineset number in the upper left corner of the card. Refer to project drawings for lineset numbering.

1. All permanent lighting pipe battens shall be permanently identified (engraved) with WHITE letters on a RED background.

2. The main drapery curtain shall be permanently identified (engraved) with WHITE letters on a BLACK background.

3. All other linesets shall be provided with WHITE backgrounds. All installed masking curtains shall be identified on the cards.

E. Outrigger brackets and a 1-1/2" schedule 40 pipe batten shall be provided to support the locking rail index lights and/or act as a scenery bumper. Outrigger brackets shall be installed on maximum 10’ centers.

2.16 INDEX LIGHT

A. An index light shall be provided for illuminating the entire length of the counterweight locking rail. Index light shall uniformly illuminate the rope locks, index cards, and lockrail all the way to the stage floor with no cutoff from the index light shroud.

B. Index lights shall be a sheet metal or aluminum enclosure rigged to the lockrail outrigger bracket by the Rigging Contractor and wired by District-designated electrician.

1. Index light enclosure/shroud shall be constructed with a masking flap that limits the onstage distribution of light and directs illumination to lockrail structure and purchase lines.

2. Index light enclosure shall not limit light from reaching floor and base of lockrail or directly below enclosure when mounted to outrigger bracket.

3. Index light source mounted to enclosure shall be a continuous LED strip light.

a. LED strip light shall contain LED’s at approximately 0.5” O.C. and shall consume approximately 4 watts/foot.

b. LED’s shall be ultra-warm white and shall be rated at 2,700 degrees kelvin.

c. LED strip light shall be mounted in an aluminum extrusion that is then fastened to the index strip enclosure with mechanical fasteners.

d. LED strip light shall contain an integral rectifier in-line with the power lead so remote drivers are not required.

e. LED strip light shall be dimmable via conventional dimmer similar to Lutron C*L Digital dimmer.

C. Index light enclosure acceptable products/manufacturers:

1. Stagecraft Industries

2. JR Clancy

3. Protech Theatrical

D. LED strip light basis of design: Lumilum #LUM-120505-2700K

E. Provide a 1-gang wall box dimmer compatible with index strip light capable of dimming strip down to 1% light output without flickering. Basis of design: Lutron Diva series.

F. Index lights and dimmer shall be rigged by the Rigging Contractor and wired by the Electrical Contractor.

2.17 TRAVELER TRACKS FOR DRAPERY CURTAINS

A. Traveler tracks shall be heavy-duty, manually operated, bi-parting, straight, with all necessary accessories for operation including end stop and mounting brackets for installation to stage batten pipes.

B. Track channels shall be continuous 2-5/8” by 2-3/4” (minimum size) 14-gauge steel up to 24’ long. Track shall be supplied with sufficient hanger clamps for support at a maximum of 6'-0" O.C.

C. Carriers shall be spaced on 12" centers and shall be urethane-tired, sealed ball bearing assemblies. Supply heavy duty hook, swivel and 6” trim chain for curtain attachment. A rubber bumper shall be attached to each carrier to reduce noise.

D. Single end pulley, double end pulley and adjustable floor block to utilize minimum 6” diameter nylatron sheaves with sealed ball bearings.

E. Bi-parting tracks shall be provided with a stretch resistant 3/8" O.D. operating line.

F. Provide an adjustable floor block with a minimum 6" diameter sheave and sand bag to maintain tension in operating line for each traveler track pull line. Sheave to be machined for 1/2" diameter operating line. Floor block to be H&H #643 or approved equal.

G. Traveler track system shall be H&H Specialties #418S-complete or approved equal.

2.18 DRAPERY CURTAINS

A. Submit two samples of all specially dyed, standard mill dyed, and natural fabrics to be used for drapery curtains under this section to the Architect and obtain his written approval thereof prior to dying or fabrication. Each sample of fabric shall be a minimum of 2 feet square and clearly marked to designate its intended use.

B. Permanently flameproof all draperies using the immersion process, unless fabric is inherently flameproof. Draperies shall meet the standards of NFPA 701 and CFC section 806 as well as any others which may be required by authorities having jurisdiction. All draperies shall meet the flame propagation performance criteria of CA. code of regulations, Title 19, Division 1, & CBC 410.3.6. Provide three copies of Certificates of Flameproofing treatment to the Architect for distribution to the School and Fire Department Officials.

C. Labeling of flameproof treated fabrics to include, but not limited to, the following information:

1. Name and address of flameproofer.
2. Date of flameproofing.
3. Type of flameproofing compound.
4. Manufacturer of flameproofing compound.
5. Trade name.
6. Age of compound at time of flameproofing for each drapery.

D. The drapery curtains shall be fabricated per the following methods:

1. Turn top of all fabric and unless otherwise noted, attach to 3” wide, heavy jute webbing with a minimum of three rows of stitching. Where fullness is specified, pleat and sew to web.
2. Hem bottom of each piece scheduled for bottom chain around 6” canvas pocket having bottom 3” above bottom of hem. Insert #8 plastic-coated or galvanized jack-chain and stitch in place to prevent bunching.
3. Hem the sides of all curtain and drapes 4” unless specified otherwise.
4. Install brass grommets 12” on center in webbing unless otherwise specified.
5. Make seams straight, without puckers or wrinkles. Clip selvages 6” on center.
6. Where specified, attach lining fabric to top web and with twill tape (at each lining seam) sewed to top of bottom hem to prevent billowing.

7. Finished dimension of curtain drapery pieces refer to the piece in its normal hanging position, after all chains or stiffening pipes have been added, and the piece is in its “working” condition.

8. Label all curtains by marking the centerline of each leg and border at the rear of the top webbing by stitching a vertical piece of red twill tape 8” long by 3/4” wide so that the top end of the tape is level with the top of the webbing and always on the drape. Identify each border and full stage drop with labels approximately 3” by 4” attached to rear of piece at left and right bottom ends, left and right top ends (on web). Attach one label each to bottom and top (on web) ends for legs and traveler curtains, alternate left and right to correspond to offstage edge of curtains. Label shall be white cloth with indelible markings designating the finished dimensions in feet and inches.

E. The main (house, or act) curtain shall be an inherently flame retardant synthetic velour, fabricated from 54” wide bolts of fabric, approximately 25 oz. per linear yard, standard mill-dyed color selected by the Architect. Fabric shall be 100% opaque The lining shall be opaque, natural cotton denim. Fabric shall be 25 oz. Prestige or approved equal. The velour pile direction shall be UP.

1. Provide 4’ turnback of face fabric at onstage and offstage sides. Sew vertical velour strips with rolled seams, 1” wide at bottom of curtain alternating 2 feet and 3 feet long at 12” on center. Attach harness snaps, double riveted through the webbing and additional backing material if required so that the snap will not separate from the webbing under a load of 35 pounds. Bottom hem 9”.

2. A finished sample of the front curtain, hemmed 9” on the bottom and 4” top and sides, shall be submitted to the Architect for review and written approval prior to fabrication of the curtain. The sample shall be a minimum of 4 feet wide by 2 feet high.

3. The main curtain shall have 75% fullness.

4. Submit sample line card with available color options to Architect & Theatre Systems Consultant at time of 1st submittal to allow Architect to select curtain color.

F. Black masking legs shall be fabricated with an inherently flame retardant synthetic velour, from 54” wide bolts of fabric, approximately 22 oz. per linear yard, black. Fabric shall be 100% opaque. Fabric shall be 22 oz. Encore or approved equal. The velour pile direction shall be DOWN.

1. Black cotton twill ties 3’-0” long shall be provided, one for each grommet plus 5% spares.

2. The masking legs shall have 50% fullness.

3. Each masking leg shall be provided with #8 plastic coated or galvanized jack chains and stitched into place to prevent bunching.

G. Black masking borders shall be fabricated with an inherently flame retardant synthetic velour, from 54” wide bolts of fabric, approximately 22 oz. per square yard, black. Fabric shall be 100% opaque. Fabric shall be 22 oz. Encore or approved equal. The velour pile direction shall be DOWN.

1. Black cotton twill ties 3’-0” long shall be provided, one for each grommet plus 5% spares.

2. The masking borders shall have 0% fullness.

3. The bottom shall include a 6" pipe pocket that shall hold a 3/4” I.D. pipe batten 2" above the bottom of the curtain.

4. Each border shall be provided with a 1/2” schedule 40 pipe, threaded and with couplers for the bottom pipe pocket, length as necessary to run full length width of curtain.

H. The midstage black traveler curtain shall be constructed the same as the main front curtain with the following exceptions:

1. Provide 2’ turnback of face fabric.

2. Curtains shall not be lined.

3. The black traveler curtains shall have 50% fullness.

4. The velour pile direction shall be DOWN

I. The black panel curtains shall be constructed the same as masking legs but with0” fullness sewn in.

J. The cyclorama backdrop shall be seamless unbleached natural muslin. End hems shall be 1”. The bottom hem shall be 6”. The bottom shall include a 6" pipe pocket that shall hold a 1” I.D. pipe batten 2" above the bottom of the curtain.

1. Provide 1/2” schedule 40 pipe, threaded and with couplers for the bottom pocket of the backdrop cyc, length as necessary to run full length width of curtain.

K. The FOH catwalk masking curtains shall be constructed the same as the midstage & upstage traveler curtains but shall be fabricated from a synthetic inherently flame retardant fabric, 15 oz. Encore or approved equal. FOH catwalk masking curtains shall be sewn with nap DOWN.

L. Provide 16-bushel canvas drapery hamper(s) for storage of any stage drapery not installed. Hampers to have hinged lid and 4 heavy duty swivel casters.

2.19 SPOT LINE RIGGING

A. Provide 5/8” hand line for miscellaneous rigging by end-user. Hand lines shall be New England Ropes Sta Set or equal. Rope lengths per project drawings. Rope to be black.

2.20 BOX BOOM LIGHTING PIPES

A. Provide and install horizontal box boom pipes at box boom openings in auditorium for mounting of stage lighting fixtures. Pipes to be fabricated from 1-1/2” Std. pipe. Pipes to be stripped, cleaned, and painted black prior to installation. Quantity and sizes of pipes per project drawings.

B. Provide Rota-lock cross clamps for securing horizontal box boom pipes to vertical pipes. Confirm size of rota-lock and horizontal pipes to be compatible with vertical pipes before supply equipment.

C. Rota-lock clamps to be by Alvin Industrial Supply, AIS-79 series.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Examine all the drawings and the specifications, review all architectural and structural drawings, and include all necessary allowances or contingencies in bid proposal.

B. Resolve all conflicts with code requirements, site conditions and the work of other trades.

C. Before beginning installation, verify that approved shop drawings reflect actual field conditions and shop drawings to the Architect in writing.

D. Provide supervision and labor necessary for the complete functioning installation of the Work of this Section.

E. Coordinate the Work of this Section with the work of others.

F. Avoid interferences with piping, equipment, architectural, electrical, and structural work.

G. When interferences develop, Architect or designated representative will decide which equipment or installation must be relocated.

H. Examine construction which affects the Work of this Section to ensure that everything is in proper condition to receive the work before beginning installation of any of the Work of this Section.

I. Verify pertinent dimensions and sizes and the appropriateness of supporting structure and devices.

J. Prior to installation, notify the Architect in writing of difficulties, deficiencies, or conflicts which may prevent proper installation of the Work of this Section. Failure to do so constitutes acceptance of construction as suitable to receive the Work of this Section.

K. Request interpretations of errors or conflicts discovered in the Drawings or Specifications as necessary to accomplish the purpose of the Drawings and Specifications. Furnish and install items necessary to implement the interpretation of the Drawings and Specifications to the satisfaction of the Architect and School without additional expense.

L. Cut no beams girders, columns, or other structural members unless specifically shown on the drawing documents and approved in writing by the Architect.

M. If necessary, patch around cuts to match adjacent, uncut construction as directed by, and in a manner acceptable to the Architect.

N. Clean structural steel items of rust, scale, and other foreign matter by grinding, if necessary.

O. Contractor is responsible for repair of work or cutting of walls, floors, or other parts of the building due to contractor’s neglect.

P. Repair of work or parts of the building due to contractor’s neglect are this contractor’s responsibility.

Q. Paint exposed metal furnished under this Section which is not factory finished or specified to have other than a painted finish.

R. Touch-up paint, field connections, welds, and abraded surfaces after erection as necessary.

S. Trim rigging sets and draperies before application for final payment.

T. Retrim rigging and draperies at a time acceptable to the School, at least 60 days after initial final trim.

U. Maintain the premises in a clean and orderly condition at all times. Clean up and from time to time during construction, remove all packing material and rubbish resulting from the Work of this Section from the jobsite.

V. Remove all tools, equipment, unused material, and rubbish from the jobsite upon completion of the project.

3.02 DRAPERY CURTAINS

A. Install on battens, tracks or other locations as shown on Project drawings or specified herein.

B. Attach drapery curtains to traverse track carrier with harness snaps, unless noted otherwise.

C. Attach drapery curtains to pipe battens with cloth ties.

D. Insert 1/2" schedule 40 pipe in curtain bottom hems and adjust for smooth uniform surface for the following types of curtains:

1. Black Masking Borders
2. Black Scrims
3. Flat Black Drops
4. Cyclorama Backdrops
5. And as noted on Theatre Systems Consultant's Drawings

E. Install all soft goods plumb, straight, and without puckers.

F. After initial installation and at least 60 days of hanging, readjust traverse curtains and backdrop cyc so that fabric is plumb and straight with bottom hem at uniform height above floor.

3.03 DRAPERY CURTAIN TRAVERSE TRACKS

A. Install tracks at locations shown on drawings and support as necessary for proper operation. Support operating line as necessary to prevent sag.

B. Attach carrier at dead end of track with nylon rope to provide stacking within pocket and full extension of curtain to outside of pocket.

C. Adjust position of tracks and curtains to part at stage centerline and travel symmetrically to full open. Provide stop rope between offstage ends of curtain and end of track to prevent excessive onstage travel of curtains, yet permit full use of track stacking space.

3.04 APPROVED RIGGING CONTRACTORS

A. The Theatrical Rigging Contractor shall be one of the following accepted firms:

1. Stagecraft Industries
   5051 North Lagoon Avenue
   Portland, OR. 97217
   (503) 286-1600
2. Protech Theatrical Services
   3431 North Bruce Street
   North Las Vegas, NV 89030

(702) 639-0290

3. LVH Entertainment Systems

   530 Los Angeles Ave. Suite #115-160
   Oxnard, CA. 93021
   (805) 278-4584

4. LA ProPoint

   10870 La Tuna Canyon
   Sun Valley, CA 91352
   (818) 767-6800

5. Wenger/JR Clancy

   7041 Interstate Island Road
   Syracuse, NY. 13209
   (315) 451-3440

B. Other contractors seeking acceptance must meet the qualifications listed below and must submit the following materials at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

1. Being a dealer for any of the manufacturers of equipment noted in this specification section does not constitute acceptance as an approved contractor. Only those contractors specifically mentioned as pre-approved will be accepted without substitution approval.

2. The Rigging Contractor:

   a. Shall have been a rigging manufacturer or have been an authorized representative or dealer of the manufacturer for a minimum of five years.

   b. Shall have been in business for a continuous period of at least ten years.

   c. Shall have completed at least ten installations of this type and scope within the past five years.

3. Submit a list of ten equivalent installations completed within the last five years including:

   a. Name and address of project including date of completion and monetary value of contract.

   b. Name and telephone number of Owner & Architect. Name of General Contractor or contract holder and Theatre Consultant (if applicable).

   c. Listing of equipment supplied and installed including quantities of major systems or component.

4. A brief written description of the contractor's operation including facilities, financial capabilities, bonding capacity, and experience of key personnel.

5. The Architect shall be the final judge of the suitability of experience.

3.05 RIGGING HARDWARE

A. H & H Specialties

B. J.R. Clancy

C. TRS/Secoa Corporation

D. ProTech

E. Thern Stage Equipment

3.06 DRAPERY CURTAINS

A. Rose Brand

B. KM Fabrics, Inc

C. J.B. Martin

END OF SECTION

SECTION 12 2113

WINDOW SHADES

PART 1 GENERAL

1.0 SECTION INCLUDES

A. Manually operated sunscreen roller shades.

B. Electrically operated room-darkening shades.

C. Local group and master control system for shade operation.

D. Local group and master control system for shade operation with addressable motors.

1.1 RELATED SECTIONS

A. Section 06100 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.

B. Section 09260 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.

C. Section 09510 - Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.

D. Division 16 - Electrical: Electric service for motor controls.

1.2 REFERENCES

A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 70 - National Electrical Code.

C. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

1.3 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.

3. Storage and handling requirements and recommendations.

4. Mounting details and installation methods.

5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

1. Prepare shop drawings on Autocad or Microstation format using base sheets provided electronically by the Architect.

2. Indicate handedness of chain pulls for manual shades and motor locations for motorized shades.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details. Cross reference furniture plan for appropriate chain locations.

E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns. Submittal of shadecloth only, without manufacturer and hardware product data, shall not be acceptable.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section. Installer to submit current documentation from the manufacturer certifying their status.

C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.

E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

F. Use only injection-molded Delrin engineered plastics by Dupont for all plastic components of shade hardware. Styrene based, PVC, or glass reinforced polyester thermo polymer plastics are not acceptable.

G. Mock-Up: Provide a mock-up of one roller shade assembly for evaluation of mounting, appearance and accessories.

1. Locate mock-up in window designated by Architect.

2. Do not proceed with remaining work until, mock-up is accepted by Architect.

H. DELIVERY, STORAGE, AND HANDLING

I. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

J. PROJECT CONDITIONS

K. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

L. WARRANTY

M. Roller Shade Hardware, Chain and Shadecloth: Manufacturer's standard non-depreciating, 25-year limited warranty. Warranty to transfer to owner upon completion of installation.

N. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating 5-year warranty.

O. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reaach inaccessible areas.

PART 2 PRODUCTS

2.0 MANUFACTURERS

A. Acceptable Manufacturer, as basis of design, performance and warranty: MechoShade Systems, Inc., no known equal; as represented by ARCHITYPE, 527 West 7th Street, Suite 801, Los Angeles, Ca. 90014; Tel: (213) 631-5001. Fax: (213) 884-4790, Contact: Jean-Guy Poitras. Email: Jean-Guy.Poitras@mechosystems.com, jeanguy@architype.net.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 2513 and must include line-by-line compliance or non-compliance with the specifications.

2.1 APPLICATIONS/SCOPE

A. Roller Shade Schedule:

1. Shade Type 1: Manual operating, chain drive, sunscreen roller shades at specied exterior windows of rooms and spaces shown on the Drawings. Shades to be surface-mounted with fascia. Wall-mount angles and fascia end caps as necessary.

2. Shade Type 2: Motorized interior room darkening roller shades with blackout fabric at specified exterior windows as shown on Drawings, and related motor control systems.

SHADE CLOTH

B. Visually Transparent Single-Fabric Shadecloth: MechoShade Systems, Inc., EuroVeil "5300" or EuroTwill "6000" Series or EuroTwill “6200” Series or EuroTwill Reversible Broken Weave “6450” Series: 0.010 diameter (0.254 mm) non-raveling vinyl/polyester yarn, fabric thickness 0.025 inches (0.635 mm). Solar shadecloth containing fiberglass is not acceptable.

1. Extra Dense Twill Weave "6000" series, 2-3 percent open.

2. Color: As selected by Architect

C. Vinyl Room Darkening Shadecloth (Single-Fabric): MechoShade Systems, Inc., "0700 series", blackout material, washable and colorfast laminated and embossed vinyl coated fabric, 0.012 inches thick (0.30 mm) blackout material and weighing 0.81 lbs. per square yard, with a minimum of 62 threads per square inch in colors selected from manufacturer's available range.

1. Color: As selected by Architect

2.2 SHADE BAND

A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.

1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.

2. Shade band and Shade Roller Attachment:

a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.

b. Provide for positive mechanical engagement with drive / brake mechanism.

c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.

d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.

e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.3 SHADE FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:

1. Bottom hem weights.

C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.

E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

F. Blackout shadebands, when used in side channels, shall have horizontally-mounted, roll-formed stainless steel or tempered-steel battens not more than 3 feet (115 mm) on center extending fully into the side channels. Battens shall be concealed in an integrally-colored fabric to match the inside and outside colors of the shadeband, in accordance with manufacturer's published standards for spacing and requirements.

1. Battens shall be roll formed of stainless steel or tempered steel and concave to match the contour of the roller tube.

2. Batten pockets shall be self-colored fabric front and back RF welded into the shadecloth. A self-color opaque liner shall be provided front and back to eliminate any see through of the batten pocket that shall not exceed 1-1/2 inches (38.1 mm) high and be totally opaque. A see-through moiré effect, which occurs with multiple layers of transparent fabrics, shall not be acceptable.

2.4 COMPONENTS

A. Access and Material Requirements:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.

2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.

3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

B. Motorized Shade Hardware and Shade Brackets:

1. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade.

2. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).

3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the motor axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade, subject to manufacturer’s design criteria).

4. Provide brackets with catch pins for shades with the following mounting conditions: top of shade mounted 25’0” or more above finished floor or/and bottom of shade is 15’0” above finished floor.

a. Provide shade hardware constructed of minimum 10GA (0.1345”) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade. Plastic components without use of steel angle construction do not meet the intent of this specification and shall not be accepted.

b. Provide minimum rate of withstand loads of 250 Lb to system with two to four pins.

C. Manual Operated Chain Drive Hardware and Brackets:

1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.

2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.

3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.

4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.

5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.

6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable

7. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.

8. Drive Bracket / Brake Assembly:

   a. MechoShade Drive Bracket model M5 shall be fully integrated with all MechoShade accessories, including, but not limited to: SnapLoc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.

   b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.

   c. The brake shall be an over -running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.

   d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.

e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.

D. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

2.5 INTELLIGENT ENCODED SHADE MOTOR DRIVE SYSTEM

A. Quiet Intelligent Motor System Performance Requirements.

1. Quiet shade operation

2. Shall not require external power/control distribution panels or line voltage motor controllers.

3. Intermediate stopping positions for shades shall be a minimum of 3-predefined intermediate positions, for a total of 5-defined and aligned positions. All shades on the same switch with the same opening height shall align at each intermediate stopping position.

4. Intermediate stopping positions are customizable electronically using occupant wall switch controls for convenience and flexibility.

5. Encoded Motors shall be software addressable and shall be capable of responding to a minimum of nine different user defined stored addresses including multiple overlapping sub groups and one local switch addresses for use by building management systems, life safety systems and other emergency inputs.

6. Two inherent methods of shade position control:

a. Cost effective, low voltage, hardwired dry-contact control for low voltage dry contact switch or 3rd party shade operation.

b. Built-in 2-way serial communication control.

c. Solartrac or Sundialer control

7. Configurable option enables the occupant to either stop the shade at any position between the upper and lower limits or to only stop the shade at the five (5) alignment positions in order to manage the uniformity of the window wall.

8. Multi-level group control:

a. Dry contact control

i. Supports independent, group and master control.

ii. Supports up to 250 motors connected to the same switch-controlled group.

b. 2-way serial communication network control Supports independent, group and master control.

i. Every motor is capable of responding to up to eight different control addresses.

ii. Each control network segment can support up to 65,025 addresses.

iii. Maximum network segment size is 250 nodes, 4000 ft. max cable length.

iv. Provides 2-way feedback of motor position, status and configuration.

9. Upgradable: Motors shall provide for the opportunity to expand and enhance its control capability and functionality without requiring hardware reconfiguration.

10. Expandable: Optional low voltage accessories shall be capable of being added to expand control options without requiring additional power supplies

11. Shade control system must allow for RS232 or Ethernet control and monitoring by 3rd party systems.

B. Shade Motors: Quiet, intelligent motors

1. Ultra-quiet 46 dBA operation within 3 feet open air from the motor

2. Tubular, asynchronous (non-synchronous) motors are concealed within the window covering assembly inside the shade roller tube or head rail.

3. Operates at 120 VAC, 60 Hz (230 VAC, 50 Hz); single phase;

4. Includes built-in reversible capacitor, temperature class A, thermally protected, totally enclosed and maintenance free

5. Available in various torques ranging from 53 in-lb (6Nm) to 352 in-lb (40Nm).

6. Maximum current draw for each shade motor is dependent upon torque which ranges from 0.9 amps (53 in-lb) to 1.8 amps (352 in-lb) @ 120 VAC or 0.56 amps to 1.5 amps @ 230 VAC respectively.

7. Equipped with line voltage, 3-conductor wiring cable possessing locking disconnect plug or NEMA 5-15P connector for bringing power to the motor.

a. Supports the daisy-chain of power from motor-to-motor to the extent permissible by local and national codes for the capacity of the branch circuit.

8. Motor assembly meets agency approvals for the North American markets covering the motor tip-to-tip including UL1004 for motor construction and performance, UL2111 for thermal overload protection and as part of a “listed” system solution to UL325 CAN/CSA 22.2 NO. 247-92 for application within window covering and drapery applications.

9. Use motors rated at the same nominal speed for all shades in the same room.

10. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade motor and tube assembly.

11. For roller shade applications supports reduced light gaps with the bracket assemblies including 3/4” drive, 7/16” idle & 7/16” center support or symmetrical 3/4” for all.

12. Includes built-in encoder to support precise and repeatable alignment.

13. Includes built-in microprocessor-based controller eliminating the need for external controllers

    a. Includes 10-year power failure memory

    b. Includes spike and brownout protection (+/- 10% of line voltage)

    c. Includes dry contact inputs for shade position control from cost effective, passive low voltage wall switches and also from third party equipment equipped with dry contact control capability without the need for external interface equipment.

    d. Supports precise and repeatable positioning of the motor to +/- 1/16”

    e. Supports from a dry contact, passive low voltage wall switch (occupant’s wall switch) or third party equipment:

        i. Momentary wall switch button press shade positioning to any point between the upper and lower limits.

        ii. Maintained wall switch button press shade positioning to any point between the upper and lower limits.

        iii. Maintained wall switch button press shade positioning at low speed motor operation for refining shade position

        iv. “One-touch” (single, momentary wall switch button press) shade positioning to five (5) alignment points including the upper limit, lower limit and three (3) intermediate stopping points (presets).

        v. Intermediate stopping points shall default to 25%, 50% and 75% of full shade travel between the upper and lower limits.

        vi. Intermediate stopping points shall be configurable to any position between the limits and in any order.

        vii. Configures the shade positioning mode:

            1) Normal Mode: enables the occupant to operate the shade to any position between the upper and lower limits.

2) Uniform Mode: enables the occupant to operate the shade only to the five (5) alignment points including the upper limit, lower limit and the three (3) intermediate stopping points.

f. Provides feedback of motor position, motor status and motor configuration to external passive accessories (ie. wall switches), intelligent microprocessor-based network accessories (ie. intelligent wall switches, network accessory cards, etc.) and third party equipment.

g. Supports future enhancements via flash firmware upgradability without removing the motor from its installation.

h. Supports optional connection to serial integration interfaces for third party equipment supporting integration by RS232 or Ethernet to various subsystems including but not limited to audio visual, lighting or BMS/BAS systems.

14. Provides low voltage power supply for external accessories up to 600 mW, eliminating the need for external bus supplies.

15. Low voltage cable with RJ45 connector supports connection to low voltage accessories (i.e. Wall switches) and to various external accessory interfaces.

2.6 LOCAL OVERRIDE

A. Provide wall switches:

1. Shades shall be operated by, 5 and 10-button low voltage standard switches, or programmable intelligent switches [IS]. Standard switch shall be connected to a motor splitter.

2. Intelligent switches may be installed anywhere on the bus line. Each IS shall be capable of storing one control level address to be broadcast along the bus line.

3. An address that is transmitted by either a switch or central controller shall be responded to by those motors with the same address in their control table.

4. IS shall provide for interface with other low voltage input devices via a set of dry contact terminals located on the switch.

5. Standard switch or IS may control an individual, sub-group or group of motors in accordance with the address in each motor.

2.7 ACCESSORIES

A. Fascia for both manual and motorized shades:

1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.

2. Fascia shall be able to be installed across two or more shade bands in one piece.

3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.

4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.

5. Notching of Fascia for manual chain shall not be acceptable.

6. Architect to select color from standard manufacturer’s finishes/colors.

B. Room Darkening Side and / or Sill Channels for Skylight shade. Architect to select color from standard manufacturer’s finishes/colors.

PART 3 EXECUTION

3.0 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.1 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.2 INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.

B. Turn-Key Single-Source Responsibility for Motorized Interior Roller Shades: To control the responsibility for performance of motorized roller shade systems, assign the design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified in this Section to a single manufacturer and their authorized installer/dealer. The Architect will not produce a set of electrical drawings for the installation of control wiring for the motors, or motor controllers of the motorized roller shades. Power wiring (line voltage), shall be provided by the Electrical Subcontractor, in accordance with the requirements provided by the manufacturer. Coordinate the following with the roller shade installer/dealer:

1. Main Contractor shall provide power panels and circuits of sufficient size to accommodate roller shade manufacturer’s requirements, as indicated on the mechanical and electrical drawings.

2. Main Contractor shall coordinate with requirements of roller shade installer/dealer, before inaccessible areas are constructed.

3. Electrical Subcontractor shall run line voltage as dedicated home runs (of sufficient quantity, in sufficient capacity as required) terminating in junction boxes in locations designated by roller shade dealer.

4. Electrical Subcontractor shall provide and run all line voltage (from the terminating points) to the motor controllers, wire all roller shade motors to the motor controllers, and provide and run low voltage control wiring from motor controllers to switch/ control locations designated by the Architect. All above-ceiling and concealed wiring shall be plenum-rated, or installed in conduit, as required by the electrical code having jurisdiction.

5. Main Contractor shall provide conduit with pull wire in all areas, which might not be accessible to roller shade contractor due to building design, equipment location or schedule.

C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

E. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 4813

ENTRANCE FLOOR MATS AND FRAMES

Part 1 – General

1.01 Summary

A. This section includes the following types of entrance flooring systems:
   1. Floor Mats & Frame Assemblies
B. Related Sections: The following sections contain requirements related to this section:
   1. Grouting frames into recess; refer to sections 03 3000 Cast-In-Place Concrete

1.02 References

A. American Society for Testing and Materials (ASTM)
B. The Aluminum Association
C. The Carpet and Rug Institute (CRI)
D. The National Floor Safety Institute (NFSI)
E. International Organization for Standardization (ISO)

1.03 Submittals

A. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01 3300.
B. Product data for each type of floor mat and frame specified including manufacturer's specifications and installation instructions.
C. Shop drawings in sufficient detail showing layout of mat and frame specified including details indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors and accessories.
D. Samples for verification purposes: Submit an assembled section of floor mat and frame members with selected tread insert showing each type of color for exposed floor mat, frame and accessories required.
E. Pedimat® AA M2 standard size 9” x 10” Mill Finish with Midnight color standard color
F. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor mats.

1.04 Quality Assurance

A. Flammability in accordance with ASTM E648, Class I, Critical Radiant Flux, minimum 0.45 watts/m^2
B. Slip resistance in accordance with ASTM D-2047-96, Coefficient of Friction, minimum 0.60 for accessible routes.
C. Standard rolling load performance is 350 lb./wheel with larger loading requirements as specified (load applied to a solid 5” x 2” wide polyurethane wheel, 1000 passes without damage).
D. Single Source Responsibility: Obtain floor mats and frames from one source of a single manufacturer.
E. Utilize superior structural aluminum alloy 6063-T6 for rail components.
F. Utilize a manufacturer that is ISO 9001 & 14001 certified.

1.05 Delivery, Storage and Handling

A. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.06 Project Conditions

A. Field measurements: Check actual openings for mats by accurate field measurements before fabrication. Record actual measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

B. Recessed Conditions: IMPORTANT: Coordination with Division 03 00 00 Concrete specifications is required. For proper installation, the concrete recess must be flat and smooth throughout. If the recess is formed by a concrete contractor, the pour dimensions may require leveling grout to achieve the proper depth and a smooth finish. The final recess depth will match the specified product and must be field verified. For proper frame installation, the side walls of the concrete recess must also be straight and smooth. Inconsistencies with the recess and side walls must be remediated prior to product installation.

Part 2 – Products

2.01 Manufacturers

A. Construction Specialties, 3 Werner Way, Lebanon, NJ 08833 USA 800-233-8493; email cet@c-sgroup.com

B. Or Equal

2.02 Materials

A. Aluminum - ASTM B 221, alloy 6063-T5, 6063-T6 for extrusions.

B. Tread insert options - refer to section 2.05.

C. Flexible TPE extrusions.

2.03 Floor Mats

A. Model and Description – M2 Pedimat AA shall be manufactured from 6063-T6 aluminum continuously hinge connected to permit rollback for easy cleaning. Overall depth without frame is 7/16” (11.1 mm). Anodized finish.

2.04 Mat Frames

A. LB – Level Base Frame shall be a 3/4"(19.1mm) deep recessed frame in 6063-T5 aluminum alloy with 1/4"(6.4mm) wide exposed surface. Black TPE filler trims shall be furnished as required when standard 2" (50.8mm) tread spacing cannot be maintained. Frame color shall be supplied in mill (standard) or optional colors as offered by manufacturer. (Custom colors are available.) Choose from anodized or heavy-duty powder coat finish. Note: Installer shall use recommended latex screed to ensure level base.

2.05 Tread Insert Options for M2 Pedimat All Aluminum

A. HD – MonoTuft HD™ Carpet shall meet CRI standard for good indoor air quality. Fibers shall include a minimum of 100, 12 mil monofilament fibers per square inch. Available in standard colors as offered by manufacturer. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths. Anti-static carpet fibers shall contain antimicrobial additive and be treated with Scotchgard® to reduce soiling. Carpet weight shall be 33-oz./yd².

Part 3 – Execution

3.01 Examination

A. Verification of conditions: Examine areas and conditions under which work is to be

performed and identify conditions detrimental to proper or timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Preparation

A. Manufacturer shall offer assistance and guidance to provide a template of irregular shaped mat assemblies to ensure a proper installation.

3.03 Installation

A. Install the work of this section in strict accordance with the manufacturer's recommendations.
B. Set mat at height recommended by manufacturer for most effective cleaning action.
C. Coordinate top of mat surface with bottom of doors that swing across to provide ample clearance between door and mat.

3.04 Cleaning

A. It is important to the life cycle of the flooring system that a maintenance schedule be developed which includes regular vacuuming and extraction that correctly matches the amount of traffic the mat incurs.

3.05 Protection

A. After completing required frame installation and concrete work, provide temporary filler of plywood or fiberboard in recess, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and project is near time of substantial completion.
B. Defer installation of flooring system until time of substantial completion of project.

END OF SECTION

SECTION 12 6100

FIXED AUDIENCE SEATING

Part 1: General Specifications

1.1 Summary:

Deliver and install the quantity shown of fixed padded and upholstered chairs as specified, floor-mounted, with self-lifting seat that rises to a uniform 3/4-safety fold position.

1.2 Submittals:

A. Product data for each chair model specified to include construction details, material descriptions and finish options

B. LEED:

1. Product data for MR Credit 4 documenting recycled content.

C. Seating layout (shop drawings) developed from the contract drawings that show aisle widths, chair spacing for each row, row-lettering and chair-numbering scheme, chair dimensions and back pitch. Layout drawings to also include locations for accessories, and accessibility provisions and attachments to other work.

D. Samples for verification & finish selection to include:

1. Initial finish selections to be made from manufacturer's standard color and fabric guides.

2. Final powder coat selection to be approved from manufacturers standard-sized samples not less than 1" x 3".

3. Final laminate selection to be approved from manufacturers standard-sized samples not less than 2" x 2".

4. Final plastic color selection to be approved from manufacturers standard-sized samples not less than 2" x 3".

5. Final wood finish selection to be approved from manufacturers standard-sized samples not less than 4" x 3".

6. Final upholstery fabric selection to be approved from fabric mills standard swatch size if available.

E. Maintenance instructions and inspection guidelines furnished for each chair model specified.

F. Manufacturers standard warranty.

1.3 Quality Assurance:

A. Source Limitations:

1. Obtain each type of fixed seating required, including accessories and mounting components, from a single manufacturer.

2. Obtain fabric of a single dye lot for each color and pattern of fabric required except when yardage requirement exceeds maximum dye lot. Multiple dye lots shall be color matched for quality assurance.

B. Fire Performance Characteristics of Upholstered Seating:

1. Fabric shall be Class 1 according to DOC CS 191 and 16 CFR 1610.61, tested according to California Technical Bulletin 117.

2. Padding shall comply with California Technical Bulletin 117.

C. Build sample chairs for each model required to demonstrate aesthetic effects and set quality standards for fabrication.

1.4 Project Conditions:

A. Environmental Limitations:
Do not deliver or install seating until spaces are enclosed and weather tight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary or permanent HVAC system is operating and maintaining ambient temperature and humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements:
Take field measurements to verify or supplement dimensions indicated on contract drawings prior to manufacturing.

1.5 Project Coordination:

A. Do not deliver or install seating until space is free of lifts and/or scaffolding used by other trades which may interfere with installation and/or damage seating.

B. Coordinate layout and installation of electrical wiring and devices with electrical contractor to ensure that floor junction boxes for electrical devices are accurately located for final connection to the building's power supply by the electrical contractor.

C. Coordinate layout and installation of seating with HVAC contractor to ensure that vents are located in a manner that will not interfere with seating installation.

D. Coordinate concrete requirements needed for proper installation.

1.6 Warranty:

A. Provide a manufacturer's warranty covering the material and workmanship for the specified warranty period from date of final acceptance.

B. Warranty Periods:

1. Structural Components: five years.

2. Operating Mechanisms: five years.

3. Plastic, Wood and Painted Components: five years.

4. Upholstery Fabric: one year.

5. Electrical Components: one year.

Part 2: Products

2.1 Materials and Finishes:

A. Steel shall meet requirements for ASTM A 36/A 36M plates, shapes, and bars; ASTM A 513 mechanical tubing; ASTM A 1008/A 1008M cold-rolled sheet; and ASTM A 1011 hot-rolled sheet and strip.

B. All exposed metal parts shall be powder coated with a hybrid thermosetting powder coat finish. The powder coat finish shall be applied by electrostatic means to a thickness of 2 - 5 mils, and shall provide a durable coating having a 2H Pencil hardness. Prior to powder coating, metal parts shall be treated with a three-stage non-acidic, bonderizing process for superior finish adhesion, and after coating shall be oven baked to cause proper flow of the epoxy powder to result in a smooth, durable finish. Manufacturer's standard color range shall be used.

C. Medium-density fiberboard shall meet requirements for ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.

D. Concealed plywood shall meet requirements for HPVA HP-1 hardwood plywood.

E. Plastic Laminate shall meet requirements NEMA LD 3, Grade VGS for vertical surfaces and Grade HGS for horizontal surfaces. Color and pattern to be be chosen from manufacturer's standard offering.

H. Upholstery fabric shall be minimum of $8.00 per yard with Fabric Mill and Pattern/Color to be selected at a later date. California Technical Bulletin No. 117 compliance required.

I. Upholstery padding shall be molded or slab polyurethane foam.

J. Molded Plastics:

1. Structural components shall be mar and dent resistant high density glass-filled polypropylene with UV stabilizers.

2. Decorative components shall be mar and dent resistant high density polyethylene (HDPE) with UV stabilizers.

3. Plastic components shall be chosen from manufacturer's standard offering] [match sample provided by architect.

2.2 Fixed Audience Seating:

A. Permanent arrangement of fixed audience seating as shown on the architectural drawings.

1. Approved manufacturers subject to compliance with requirements outlined herein.

2. Basis-Of-Design for fixed audience seating is Irwin Seating Company Citation Model 90B.12S.86E.4C as represented by:

Sierra School Equipment Company
3003 Citation Way
Bakersfield, CA 93308
(661) 399-2993-Office / (661) 399-0218-Fax / estimating@ssecinc.com

or comparable products via substitution requests received at least two weeks prior to bid opening date with approval of proposed substitution via an official addendum.

B. Chair support columns shall be a formed 14 gauge (.0747") steel tube with an integral back wing plate. Column shall exhibit a 10° rearward incline to help conceal back attachment hardware. Column shall be welded to a 2-1/2" x 1" rectangular pillar that extends back toward the riser face. Pillar is fabricated from 14-gauge steel at an appropriate angle to provide riser clearance for the chair as well as proper seat and back height. Brackets for seat attachment shall be 7-gauge (.1875") steel for superior strength, formed with an integral support buttress. Pillar shall be welded to a ¼" steel attachment plate used to secure the chair to the riser face. All steel components shall be robotic welded for precise assembly and exceptional integrity.

C. Aisle end panels shall be keystone-shaped, constructed of medium density fiberboard (MDF) and surfaced with Maple Wood Veneer with standard stain selections with a lacquered edge to match the dominant color of the laminate. Panels shall be provided with a seat bracket recess for precise location and support of the panel. Panel is secured to a 14 gauge formed steel bracket bolted to the top of the support column and directly to the support column with the use of a spacer. Panel bracket assembly is concealed behind a steel shroud attached with a tamper resistant screw.

D. Armrest: Shall be Comfort Curved Solid Maple Hardwood Armrests with standard stain selections.

D. Backs shall be rectangular shaped, padded and upholstered on their face, with a one-piece injection molded polymer rear panel. The foundation of the back component shall be provided by a 7/16" thick, 5-ply hardwood inner panel that shall also serve as the upholstery substrate. The face of the back shall be upholstered over a 2" thick polyurethane foam pad. The polyfoam pad shall be securely cemented to the plywood inner panel and upholstered with a 1-piece cover securely fastened to the hardwood inner panel by means of upholstery staples to facilitate ease of re-upholstering. The rear designer panel shall be injection molded HDPE plastic, high impact-resistant, with textured outer surface, formed to enclose the edges of the inner upholstery panel at the top and both sides of the back, and shall be not less than 25" in length, extending down to the rear of the seat. There shall be no exposed screws above the armrests. Wings used for the attachment of the complete back assembly to the standards shall be not less than 14 gauge (.0747") steel. Wings shall be firmly secured to the inner panel through the use of threaded t-nuts fastened to the inner panel. Assembled chair shall have a nominal back height of 34". The back assembly shall be certified through routine ISO testing to withstand a 250 lb. static load test applied approximately 16" above the seat assembly and a 100,000 cycle 40 lb. swing impact test.

E. Seats shall be padded and upholstered on their top surface with a structural, injection molded polypropylene seat foundation. Seats shall self-rise to a uniform position when unoccupied. The mechanism shall be certified through routine ISO testing to exceed 300,000 cycles during ASTM Designation F851-87 Test Method for Self-Rising Seat Mechanism. In addition, the seat shall withstand as a 600 lb. static load test applied approximately 3" from the front edge of the seat assembly and a 50,000 cycles 125 lb. vertical drop impact test.

1. Seat foundation shall be engineered glass-filled, injection molded polypropylene, strengthened by deep internal ribs and gussets, completely enclosing the self-rising hinge mechanism. Bottom surface of the foundation shall be textured and feature an attractive molded recess. Bolted attachment of the seat assembly to the chair standard shall be concealed by an integral color-coordinated plastic cap to present a finished, refined appearance.

2. When unoccupied, the seat shall rise automatically to a 3/4 safety fold position, and upon a slight rearward pressure, shall achieve full-fold, allowing the patron additional passing room. The seat shall rotate on two, molded acetal shafts supported by nylon bearings with integral down-stops for exceptional strength. Seat-lift shall be accomplished by compression springs and self-lubricating plastic cams.

3. The base structure for the cushion assembly shall be an ergonomic contoured, rigid thermoplastic resin panel covered with a 3" thick molded polyurethane foam pad. Cushion assembly is upholstered with a carefully tailored fabric cover secured around the perimeter of the thermoplastic resin panel by means of a drawstring and staples and securely locked to the

seat foundation, preventing unauthorized removal; but facilitating convenient access by trained maintenance personnel.

F. Chair width shall vary to accommodate sightlines and row lengths from center to center of armrests.

G. Back height and pitch shall be fixed as shown on seating layout drawings.

I. Row-lettering and chair-numbering shall be provided for identification of all chairs as shown on approved seating layout drawings. Number plates shall be 5/8" x 1-5/8" aluminum with a bronze finish and black sans serif numerals. The seat pans shall be recessed at the center of the front edge for the number plates, and attached by two (2) pop rivets. Letter plates shall be 2" round with a bronze finish and black sans serif numerals attached in recess of aisle standard by two (2) escutcheon pins. Attaching hardware shall have a finish compatible to plates.

J. Accessible Seating:

1. Shall be designated on the seating layout drawings and designed to allow an individual to transfer from a wheelchair to the theatre chair. The aisle standard shall be equipped with Swing-Away mechanism that allows sideways access to the seat. Aisle standards so equipped shall be provided with a label, displaying an easily recognizable "handicapped" symbol. A Flip-Up type ADA armrest will not be acceptable.

K. Aisle Lighting:

Aisle lights shall be furnished for aisle standards designated on the approved seating layout drawings. Aisle lights shall be low voltage, non-hazardous 12 volt, D.C. Fixtures shall be mounted at the top of the aisle decorator panel to provide illumination of the aisle panel and adjacent floor and/or steps. Fixtures are 2-1/4” diameter black hooded assemblies with high-output, light emitting diodes (LED) designed to provide an even, consistent wash of white illumination. The aisle light standards are to be provided pre-wired with approximately 18" of wiring extending beyond the base of the standards. Wiring shall be encased within a black, rubber-coated flex steel conduit that exits the column just above the foot. Seating supplier shall furnish as part of the aisle light package a voltage reduction device suitable for conversion of 120 volt, A.C., facility power to 12 volt, D.C., for aisle lights requirement. The voltage reduction device shall be Underwriters' Laboratories listed as a Class II Power Unit for proper supply of power to the aisle lights. All wiring connections from the electric distribution system to the aisle light standards, as well as installation, proper safe mounting, and connection of the voltage reduction device, shall be the responsibility of the electrical contractor, including provision of suitable locking-style electrical disconnect device.

L. Furnish extra materials from the same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish complete seat and back assemblies equal to 3% of amount installed for each type and size of chair seat and back.

2. Furnish seat and back fabric covers equal to 5% of amount installed for each type and size of cushion.

3. Furnish aisle light assemblies equal to 10% of amount installed for each type of aisle light installed.

2.3 Fabrication:

A. Manufacture fabric-covered cushions with molded padding beneath fabric and with fabric covering free of welts, creases, stretch lines, and wrinkles. For each upholstered component, install pile and pattern run in a consistent direction.

B. Fabricate floor attachment plates to conform to floor slope, if any, so that standards are plumb and chairs are maintained at same angular relationship to vertical throughout project.

C. Fabricate riser attachment plates to conform to riser heights so that standards are plumb and chairs are maintained at same angular relationship to vertical throughout project.

Part 3: Execution

3.1 Examination

A. Prior to layout and installation examine floors, risers, and other adjacent work and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the work including, but not limited to, plumb of riser faces and concrete conditions.

B. Examine locations of electrical connections.

C. Examine locations of HVAC supply ducts.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

A. Install seating in locations indicated and fastened securely to substrates according to manufacturer's written installation instructions.

B. Use installation methods and fasteners that produce fixed audience seating assemblies with individual chairs capable of supporting an evenly distributed 600-lb static load applied 3” from front edge of the seat without failure or other conditions that might impair the chair's usefulness.

C. Install seating with chair end standards aligned from first to last row and with backs and seats varied in width and spacing to optimize sightlines.

D. Install riser-mounted attachments to maintain uniform chair heights above floor.

E. Install chairs in curved rows at a smooth radius.

F. Install seating so moving components operate smoothly and quietly.

G. Install wiring conductors and cables concealed in components of seating and accessible for servicing.

3.3 Field Quality Control

A. Perform tests and inspections.

B. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust chair backs so that they are properly aligned with each other.

B. Adjust self-rising seat mechanisms so seats in each row are aligned when in upright position.

C. Verify that all components and devices are operating properly.

D. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.

E. Replace upholstery fabric damaged during installation.

End of Section

SECTION 14422

WHEELCHAIR LIFTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 01 apply to this section.

B. Section Includes:

1. Wheelchair lifts as indicated.

C. Related Sections:

1. Division 16: Electrical.

1.02 SUBMITTALS

A. Materials Lists: Submit a complete list of proposed items to be furnished and installed.

B. Shop Drawings: Submit complete Shop Drawings indicating dimensions and locations of items, including required supporting structure.

C. Product Data: Submit manufacturer's specifications, catalog cuts and other data, demonstrating compliance with the specified requirements.

D. Selection Samples: For each finish product specified requiring selection of color or finish, two complete sets of color charts representing manufacturer's full range of available colors and patterns.

E. Installation Instructions: Submit manufacturer's printed installation instructions.

F. Submission of all material proposed for use shall be in accordance with Section 38 of the Construction Services Agreement.

G. Provide owners operational and maintenance instructions

1.03 QUALITY ASSURANCE

A. Manufacturer of wheelchair lift shall have been regularly engaged in the business of manufacturing, installing and servicing wheelchair lifts of the type specified for at least 10 years, and shall have a local history of successful installations.

B. Wheelchair lifts shall comply with the State of California Title 8, Subchapter 6, Elevator Safety Orders, and ANSI A 17.1.

C. Wheelchair lifts shall comply with CBC, Section 11B-206.7, 11B-207.2, 11B-410, and 3001.2, 3001.4; and ASME A18.1 (2014 ed.),

1.04 WARRANTY

A. Provide a 2 year material warranty for motor drive system.

B. Provide a 2-year unconditional warranty commencing n recordation date of the Notice of Completion in accordance with Section 21 of the Construction Services Agreement.

C. Review equipment with District prior to the end of the warranty period.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Vertical Wheelchair Lifts, as manufactured by Savaria Model No. V-1504 Vertical Platform Lift which is the Basis of Design.

2.02 COMMERCIAL WHEELCHAIR LIFT

Hydraulic Vertical Platform Lifts: Savaria V1504-STD.

Hydraulic Vertical Platform Lift: The lift described here, manufactured by Savaria Lifts Inc, is a vertical platform lift consisting of a hydraulic tower with a lifting platform. The platform is made to accommodate a wheelchair user or a person with impaired mobility. The lift can be used indoor or outdoor (with optional package) and in commercial or residential applications.

A. Work described in this section includes providing equipment, incidental material and labor required for complete, operable roped hydraulic wheelchair lift installation. Lifts shall be erected, installed, adjusted, tested and placed in operation by lift system manufacturer, or manufacturer's authorized installer.
   1. Lifts shall be in accordance:
      a. ASME A18.1 and ADAAG compliant
      b. ASME A18.1 and A117.1 compliant
      c. ASME 18.1 (2104 ed.)
      d. 2019 CBC

B. The following preparatory work to receive the lifts specified in this section is part of the work of other sections:
   1. Permanent 120 VAC, 20 amp single phase power to operate lift to be provided from a lockable fused/cartridge type disconnect switch with auxiliary contacts for battery operation. Refer to drawings for permanent power specifications and location of disconnects. Temporary power may be provided to expedite installation of lift.
   2. Provide a plumb and square hoistway with smooth interior surfaces, including fascias or furring of the hoistway interior.
   3. Provide rough openings per lift contractor's shop drawings.
   4. Provide substantial, level pit floor slab as indicated on the lift contractor's shop drawings.

C. Characteristics:
   1. Rated Load: 750 lb (340 kg).
   2. Rated Speed: 20 fpm (0.10 m/s).
   3. Car Dimensions: 36 inches W by 48 inches D (914 mm by 1219 mm)
   4. Levels Serviced: 3
   5. Car Configuration: Front/rear exit, 90 Degree Exit at third level.
   6. Travel: 12’-9”. Maximum of 14’.
   7. Pit Depth: 3” Standard.
   8. Powder Coat Finish: Optional Color – From manufactures color chart
   9. Operation: Constant pressure.
   10. Power Supply: 110 volt, 20 amp, 1 phase, 60 Hz.

11. Drive System: 2:1 Roller chain hydraulic.

12. Emergency Power: Battery operation in down direction – Standard. Provide sufficient power for 5 upward and downward trips per CBC 11B-207.2. Battery shall be self-rechargeable.
13. Controller: Relay logic based controller.
14. Motor/Pump: 1 HP (112 kw), gear type
15. Manual Lowering: Outside the hoistway at lower landing.
Per CCR, Title 8, Section 3094.2(g), vertical (wheelchair) lifts shall have a manual lowering device. The lowering device is for use by others to lower the lift to the lower landing should the lift downward motion become impaired. The lowering device shall comply with the following;
    a. The device shall be secured against unauthorized use.
    b. The device shall be operable or accessible from outside the enclosure.
    c. When necessary to access the runway to operate the device, an opening in the runway with a lockable cover/panel shall be provided. The opening and cover/panel shall comply with the following:
        1. The opening shall be of sufficient size and located to allow safe access and reach to the lowering device; and
        2. The cover/panel shall be kept locked and the key shall be available on the premises during normal business hours and after-school activity hours under the control of an authorized person.

D. Car Enclosure:
1. Cab Configuration: Side Guards of platform shall have a steel frame with a powder coat finish and steel panel inserts to a minimum of 42 inches (1067 mm) high
2. Cab floor shall be slip resistant.
3. The cab interior shall be smooth and solid.

E. Doors and Gates:
1. First landing door:
    d. Door type: 80” High 1-1/2 hour UL/ULC fire-rated Prodoor with concealed hinges and a concealed electro/mechanical interlock.
    e. Flush closing operation with hoistway side.
    f. Operation: Manual – with hydraulic closer
    g. Door Width: 36 inches (889 mm) clear opening.
    h. Door shall remain open for 20 seconds minimum.
    i. The clearance between the platform sill and the edge of any runway landing shall be 1 ¼” maximum.
2. Second landing door.
    a. Door type: 80” High 1-1/2 hour UL/ULC fire-rated Prodoor with concealed hinges and a concealed electro/mechanical interlock.
    b. Flush closing operation with hoistway side.
    c. Operation: Manual – with hydraulic closer
    d. Door Width: 36 inches (889 mm) clear opening.
    e. Door shall remain open for 20 seconds minimum.
    f. The clearance between the platform sill and and the edge of any runway landing shall be 1 ¼” maximum.
3. Third landing door.
    g. Door type: 80” High 1-1/2 hour UL/ULC fire-rated Prodoor with concealed hinges and a concealed electro/mechanical interlock.
    h. Flush closing operation with hoistway side.
    i. Operation: Manual – with hydraulic closer
    j. Door Width: 42 inches (889 mm) clear opening.
    k. Door shall remain open for 20 seconds minimum.
    l. The clearance between the platform sill and and the edge of any runway landing

shall be 1 ¼" maximum.

4. Per CBC Section 410.8, a restriction sign complying with CBC Section 11B-703.5 and ASME A18.1 Section 2.7.4 shall be securely fastened/posted in a conspicuous place at each landing and within the platform enclosure stating "No Freight" and shall include the International Symbol of Accessibility complying with CBC Section 11B-703.7.2.1. The letters used shall be 5/8" high minimum.

F. Call Stations: Provide flush, surface or door frame mounted landing call/send stations.

1. Call stations will be:
   a. Keyless

G. Car Operation:

1. Platform lifts shall not be attendant-operated and shall provide unassisted entry and exit from the lift.
2. Car Operating Panel shall consist of constant pressure buttons, emergency stop/alarm button, on/off key switch (when applicable) and emergency LED light mounted on a removable stainless steel panel (Type 304 #4 Stainless Steel Finish). All operable parts of controls shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. The force required to activate operable parts shall be 5 pounds maximum (CBC 11B-309).
3. Auxiliary lighting: The car shall be equipped with a battery operated LED light fixture. The battery shall be the rechargeable type with an automatic recharging system.
4. Telephone: The car shall be equipped with an ADA Hands free phone.
5. Controls for lifts shall comply with ASME A18.1 Section 2.10.1;
   a. Controls shall be 48" max. and 15" min. above the platform floor or facility floor or ground level.
   b. Operating devices shall be designed so that both the 'UP" and "DOWN" circuits cannot be operated at the same time.

H. Pumping Unit and Control:

1. The pumping unit and control shall be enclosed in the tower. The controller and pump unit shall be pre-wired and tested prior to shipment. The controller is to be relay logic based operation for ease of maintenance and service. Pump unit shall incorporate the following features:
2. Adjustable pressure relief valve.
3. Manually operable down valve to lower lift in the event of an emergency. Thisvalve shall be activated from outside of the hoistway through a keyed box.
4. Pressure gauge isolating valve, manually operable.
5. Gate valve to isolate cylinder from pump unit.
6. Electrical solenoid for down direction control.
7. Emergency Operation - A manual lowering device shall be located outside the hoistway in a lockable box positioned at a lower landing.

I. Cylinder And Plunger:

1. The cylinder shall be constructed of steel pipe of sufficient thickness and suitable safety margin. The top of the cylinder shall be equipped with a cylinder head with an internal guide ring and self-adjusting packing.
2. The plunger shall be constructed of a steel shaft of proper diameter machined true and smooth. The plunger shall be provided with a stop electrically welded to the bottom to prevent the plunger from leaving the cylinder.

J. Roller Chains: Two No.50 roller chains with 5/8 inch (16 mm) pitch. Minimum breaking strength 6100 lb (2773 kg) each.

K. Leveling Device:

1. The lift shall be provided with an anti-creep device which will maintain the

carriage level within 1/2 inch (12 mm) of each landing.

2. All limit switch and leveling device switches shall be located in a position to be inaccessible to unauthorized persons. They shall be located behind the mast wall and be accessible through removable panels.

L. Guide Yoke: The 2:1 guide yoke/sprocket assembly shall be supplied with idler sheaves, roller guide shoes, bearings and guards.

M. Terminal Stopping Devices: Normal terminal stopping devices shall be provided at top and bottom of runway to stop the car positively and automatically.

N. Guide Rails and Brackets: Steel 'C'' guide rails and brackets shall be used to guide the platform and sling. Guide rails shall form part of the structural integrity of the unit and be integral to the mast enclosure, ensuring stability and minimum platform deflection when loaded.

O. Car Sling: Car sling shall be fabricated from steel tubing 44 inches (1116 mm) high with adequate bracing to support the platform and car enclosure. Roller guide shoes shall be mounted on the top and bottom of the car sling to engage the guide rails. Guide shoes shall be roller type with 3 inches (76 mm) diameter wheels. Nylon guide shoes shall not be used for better ride quality and durability.

P. Wiring: All wiring and electrical connections shall comply with applicable codes. Insulated wiring shall have flame-retardant and moisture-proof outer covering and shall be run in conduit or electrical wire ways if located outside the unit enclosure. Quick disconnect harnesses shall be used when possible.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin installation until hoistway and machine room has been properly prepared.

B. Site dimensions shall be taken to verify that tolerances and clearances have been maintained and meet local regulations.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.02 INSTALLATION

A. Install the Work of this section in strict accordance with reviewed Shop Drawings, Drawings, Specifications, regulations, and codes.

B. Install all the components of the lift system that are specified in this section to be provided, and that are required by jurisdictional authorities to license the lift.

C. Trained employees of the lift contractor shall perform all installation work of this section.

D. Adjust lift for proper operation and clean unit thoroughly.

E. Instruct users in operation procedures and Owner's maintenance person in trouble-shooting and maintenance procedures.

3.03 TESTING

A. Obtain and pay for state and local permits and inspections required by elevator inspection authorities and perform tests required by regulations of such authorities. Tests shall be performed in the presence of authorized representatives of such authorities and the IOR. Requests for testing and inspection shall be provided at least 48 hours in advance of the desired date.

3.04 NOTIFICATION

A. The Project Inspector shall be notified upon completion of equipment testing and approval by the state authority.

3.05 TRAINING

A. Before Substantial Completion, provide Owner personnel a 2 hour instruction period in operating the equipment safely and meet the requirements of the State of California Title 8 for maintenance of special access lifts.

3.06 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.07 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 23 1313

AUTOMATIC FIRE SPRINKLERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Design, furnish and modify existing wet pipe fire sprinkler system for protection of building.

B. Furnish all labor, materials, services, testing, transportation and equipment necessary for and reasonably incidental to the proper and satisfactory installation of the automatic fire protection systems as specified herein.

C. Work or equipment not indicated or specified which is necessary for the complete and proper operation of the work of the Section in accordance with the true intent and meaning of the contract documents shall be provided by this contractor and incorporated under this Section of the work at no additional cost.

1.2 DESIGN REQUIREMENTS

A. Wet pipe fire sprinkler system shall conform to NFPA13, 2016 edition.

1. Contractor shall prepare fully coordinated shop drawings for approval prior to installation. Piping system shown on plans is for reference only and general design intent. Contractor shall not make substantial changes and must determine final number of fittings and routing to meet system and building demands.
2. Pipe sizes used in shop drawings shall not be less than those shown on drawings.
3. No AutoCAD backgrounds of the fire sprinkler system piping network will be available.

B. Manufacture’s Data

1. Submit complete and detailed equipment and material list of items to be furnished and installed under this Section.
2. Submit manufacturer’s specifications and other data required to demonstrate compliance with specified requirements.

C. Drawings and Hydraulic calculations

1. System shall be hydraulically designed per NFPA 13 requirements.
2. Drawings shall be made in AutoCAD 2015 version as the latest. Drawings shall be same size as contract drawings.

1.3 QUALIFICATIONS

A. Code Requirements: All work covered by this Section shall conform to the 2016 edition of NFPA 13, California State Fire Marshal, DSA, Uniform Fire Code with California amendments.

B. UL and FM Compliance: All material and components shall be UL listed and labeled and/or Factory Mutual Approved for the application anticipated.

C. Permits and Inspections: Contractor must obtain and pay all fees for permits, licenses, inspections, etc. which are required and shall deliver all certificates to Owner.

D. Installing contractor shall have a current C-16 license and have had prior experience in similar scope of this project within last 5 years.

1.4 REGULATORY REQUIREMENTS

A. All work covered in this Section shall conform to the regulatory requirements of California State Fire Marshal, DSA, Uniform Fire Code with California amendments. If there are conflicts the stricter standard shall apply.

1.5 SCHEDULING

A. Contractor shall coordinate installation of system with all other trades.

B. Examination of Premises

1. Contractor shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By submitting a proposal for the work under this section of the specification, the Contractor shall be deemed to have made such a study and that they are familiar with and accepts all conditions of the site.

C. Coordination

1. Contractor shall cooperate and coordinate his work with all other trades to avoid confliction and permit for a neat and orderly appearance of the entire installation. The contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawing or in specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, this cost shall be charge to this Contractor.
2. Piping runs found to be in conflict with the work of other trades, as a result of neglected coordination, shall be removed and reinstalled in new locations designated by the architect at no additional cost to the Owner.
3. To achieve coordination, contractor shall contact Architect and obtain necessary information to design his system into the allotted spaces without interfering with work by other trades.

PART 2 - PRODUCTS

2.1 REQUIRMENTS

A. Submittal Data

1. Furnish and install at one time, in accordance with General Conditions, six bound copies of valid submittal data on all material, equipment and devices. The Contractor shall make all presentations and clarifications although he may bring suppliers and representatives for technical assistance to meetings called by architect. Each submitted item shall be indexed and referenced to these specifications and to put identification numbers on fixture and equipment submittals.
2. Submittals are required on all items to insure the latest and most complete manufacturer's data is available for review. Manufacturer's submittal literature and shop drawings often contain information not available in design literature; requirements of the submittals and engineer's submittal notes are part of the work of this Section except that engineer's notes may be used as a means of increasing the scope of work of this Section.
3. Submittals will be checked for general conformance with the design concept of the project, but the review does not guarantee quantities shown and does not supersede requirements of the Division to properly install work.

B. Wet Pipe System

1. Black Steel, 1"-2", Schedule 40, ASTM A135 or ASTM A795 for all piping with threaded joints and fittings. Pipe must be UL Listed, or FM approved.
2. Black Steel 2 ½" -6", Schedule 10, ASTM A135 or ASTM A795 for all piping with grooved joints and fittings.
3. Threaded fitting shall be cast iron, class 125, conforming to ANSI B16.3 and ANSI B16.4.
4. Flanged fittings shall be cast iron, class 125, conforming to ANSI B16.9.
5. Welded fitting shall be forged steel welding outlet fitting conforming to ANSI B1.20.1
6. One-piece reducing fittings shall be used wherever a change is made in pipe size. Bushings and reducing couplings shall not be permitted.

C. Sprinkler Heads

1. Provide sprinklers of types and sizes as indicated on drawings.
2. Provide upright sprinklers in areas with exposed piping.
3. Sprinklers shall be glass bulb type.
4. Sprinklers in concealed spaces, exterior locations and any other areas which may experience over 100 degrees F ambient temperatures shall be furnished with 200 to 225 degree rated sprinklers. Sprinkler heads in boiler rooms shall be furnished with sprinklers rated at 250 to 290 degrees F.
5. Sprinklers may be 401 canopy type with head guard installed in ceiling with surface mounted lighting.
6. Sprinkler heads in light hazard occupancy shall be quick response type. Sprinklers shall be same manufacturer throughout. Extended coverage heads will not be permitted.
7. Sprinklers shall be installed in center of tile at 12" increments from tile edge and shall be aligned with other ceiling mounted devices.
8. Sprinkler head guards shall be installed where any sprinkler is subject to damage and at elevations of 7'-6" or lower in exposed locations. Sprinkler head guards shall utilize a bolt-on feature to the base of the sprinkler or be a factory installed guard. Install head guards in gymnasium and locker room.
9. Sprinklers installed underneath catwalks, floors or other intermediate areas shall have intermediate heat shield attached.
10. Flow indicator shall have retard feature and set between 45 and 90 seconds. Connection of this work shall be under Division 16. All shut-off valves including PIV and backflow preventer shall be electronically supervised.
11. Pipe through ceilings at head locations shall be furnished with a two-piece or fully concealed escutcheon. Escutcheons shall be identical and match the other escutcheon of the same type throughout the building. Exposed pipe through walls and =ceilings shall have split ring chrome escutcheon.

12. Furnish and install all required signs, spare heads, special wrenches and spare sprinkler heads and boxes as required by NFPA13.
13. Sprinkler system piping shall be provided with complete drainage as required by NFPA 13. All drain valves shall be plugged and piped to accessible location. Those installed within walls shall be equipped with locking access panels.
14. Provide seismic separation assemblies as indicated. Assembly shall be UL/FM swing joint assembly rated at a minimum of 175 psi.
15. System main drain shall be piped to nearest standpipe drain in riser room.
16. Hanging, bracing and support shall utilize only UL/FM approved products and comply with NFPA 13. Hanging, bracing and supports shall be by one manufacturer and listed as an approved assembly.

2.2 MATERIALS

A. ACCESS PANELS

1. Square, stainless steel, with vandal proof door lock operated by allen wrench: Manufacturer's: Smith – 4760, Elmdor – DW-AKL

B. Globe or Angle Valves: UL/FM

1. Bronze 2 inches and smaller, screwed in bonnet, threaded ends, riding stem: Manufacturers: Nibco-T301, Kennedy-98 SD – United-126T

C. Automatic Sprinkler Head

1. Brass uprights – temperature, size and k-factor as indicated on drawings: Manufacturers: Tyco-TY3131
2. Fully concealed, white or chrome cover: temperature, size and k-factor as indicated in drawings. Manufacturer Tyco-TY3531
3. Chrome dry pendent, temperature, size, and k-factor as indicated on drawings. Manufacturers: Tyco-TY3235

D. Gear Operated Butterfly Valves: Grooved end, gear operated Butterfly Valve, 300 psi for fire protection and sprinkler risers. UL/FM Listed and Approved, with weatherproof gearbox and DPDT monitor switch, double seal design for bubble tight shut off at 175 psi. Corrosion resistant, fusion bonded nylon II body coating, easy to read position indicator: Manufacturers: Victualic705W, Tyco-580, Nibco-GD-4765-8N,.Kennedy-82M

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which Work of this section shall be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove all burrs. Bevel or groove all plain end ferrous pipe ends.

B. Protection

1. All work, equipment and materials shall be protected at all time. Contractor shall repair all damage caused either indirectly or directly by his own workers. Contractor shall also protect his own work from damage. He shall sloe all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury.
2. Contractor shall be held responsible for all damage to equipment and material until he has received written notice from the Architect or Engineer that work has been accepted

C. Uninspected work

1. The contractor shall not allow or cause any of his work to be covered up or closed until it has been inspected, tested and approved by all authorities having jurisdiction and until Project Record drawings have been properly annotated.
2. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related work cost shall be borne by the contractor.

D. Record Drawings

1. Contractor shall provide and keep up-to-date a complete “as-built” record set of red line drawings which shall show every change from the original drawings and the exact “as-built” locations and size of the work provided under this section. This set shall include locations, dimensions, depth of bury. On completion of the work this set of prints shall be delivered to the Architect and updated on CAD drawings by Contractor.

E. Final Approval

1. Prior to final acceptance of the installation, the contractor shall furnish to the Architect “certificates of approval” signed by the State Fire Marshall having jurisdiction, stating that the systems, as installed, have been inspected and tested and meet all governing code requirements.

F. Guarantees

1. Contractor shall guarantee the automatic fire sprinkler system unconditionally for a period of one (1) year after final acceptance. If during this period, any material, equipment or any part of the system fail to function properly, Contractor shall make good the defects and without any expense to the Owner.

3.3 CLEANING

A. Remove scale and foreign matter from inside and outside of pipes before assembly.

3.4 INSTALLATION

A. Install underground piping connected to detector check or water main indicated 5’-0” from building. Braced or clamped bends shall be in accordance with the requirements of NFPA 24. Provide vertical clamp rods at flange and spigot piece of riser, long enough to pass through riser’s base flange where required. Furnish concrete thrust blocks where required. Tracer wire shall be according to other provision of this project’s specification.

B. Install check valves, control valves, gauges inspectors test and drain assemblies and flow indicator per DSA approved drawings.

C. Pipe through floors, wall and ceiling, at head locations, shall be furnished with required sleeves, escutcheons and fire caulking where indicated or required by code. Escutcheons shall be polished chrome plated in unfinished area and white in areas with ceilings unless other finish is selected by Architect.

D. Sprinkler system shall be provided with complete drainage facilities in accordance with CBC standards. Drain discharge shall be into sanitary sewer and such drainage receptacles shall be designed to accept the full flow of water at drain test conditions under full working pressure.

E. Upon completion of work and before substantial completion, subject entire system, including underground piping, to tests as required by NFPA13 and CBC standards and furnish Owner with a certificate of compliance as required.

F. Close nipples and threaded unions are prohibited. Where a threaded union or coupling is need, a groove type fitting shall be used.

G. Mechanical tee bolted branch outlet fittings and plain-end locking fittings are prohibited.

H. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be of elastomer grade suitable for the intended service, and shall be molded and produced by the coupling manufacturer.

I. Sprinkler lines within the building shall be concealed within the structure. Risers shall be installed as indicated in drawings.

J. Sprinklers that have been dropped, damaged, have cracked bulbs, or show a visible loss of fluid shall not be installed.

K. Sprinkler bulb protectors shall be removed by hand after installation.

L. Routing of pipe in exposed areas shall be subject to the Architects approval in the final shop drawings.

M. Underground piping shall have a 36" minimum bury. Pipe shall be installed on a flat undisturbed sand bed. After required pressure leak test, pipe shall be covered with sand not less than 6 inches thick before backfilling. Comply with all NFPA Standards.

3.5 CLEANING

A. Remove rubbish, debris and waste material and legally dispose at off-project site.

END OF SECTION 211313

SECTION 22 05 17

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.
3. Grout.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions

surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

   a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

      1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

   b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.12 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.13 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 SLEEVES: Shall be plastic or galvanized steel where pipes pass through concrete walls or floor slabs.

A. Isolate pipes through ground floor slabs with Kraft paper, plastic tape or similar materials unless conduit is specified or indicated.

B. Sleeves for pipes through exterior walls shall be non-metallic with minimum 2” weep ring as manufactured by Link Seal. Pipe shall be sealed with Link Seal modular seal with EPDM seal elements.

C. Sleeves in or through fire rated walls shall be per U.L. Fire Resistance System No. WL1146 for drywall construction, and U.L. Fire Resistance System No. CAJ1044 for concrete construction. See architectural plans for all locations of rated walls.

D. Below-grade piping through exterior walls shall be sealed using Link Seal modular seal with nitrile seal elements and stainless steel bolts and sleeves as manufactured by Century Line.

E. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

F. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

G. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.2 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, Inc.
2. Metraflex Company (The).
3. Pipeline Seal and Insulator, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.
3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls below Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

2. Concrete Slabs-on-Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs above Grade:

   a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.

4. Interior Partitions:

   a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.

END OF SECTION 22 05 17

SECTION 22 05 18

ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions

surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

   a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

      1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

   b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.12 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.13 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished, chrome-plated or rough-brass finish.
f. Bare Piping in Equipment Rooms: One-piece, cast-brass type with polished, chrome-plated or rough-brass finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.
2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 22 05 18

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Bronze ball valves.
2. Ductile-iron, single-flange butterfly valves.
3. Bronze lift check valves.
4. Bronze swing check valves.
5. Bronze gate valves.
6. Iron gate valves
7. Manual circuit balancing valves.
8. Gas shut-off cocks.
9. LPG shut-off cocks.

B. Related Sections:

1. Division 2 water distribution piping Sections for general-duty and specialty valves for site construction piping.
2. Division 15 plumbing piping Sections for specialty valves applicable to those Sections only.
3. Division 15 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene diene terpolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED

ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.12 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61-G and NSF-372 for valve materials for potable-water service.

1. Valves for domestic water must comply with the Federal Reduction of Lead in Drinking Water Act.
   a. "Lead Free" refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%.
   b. All valves must be 3rd party certified.
   c. Bronze valves shall be made of dezincification-resistant material.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

1.14 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.15 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.16 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Piping systems shall be supplied with valves arranged so as to give complete and regulating control of each building and piping systems throughout the building, and located so all parts are easily accessible and maintained.

1. Valve Design: Rising stem or outside screw and yoke stems. Non-rising stem valves may be used where space conditions prevent full extension of rising stems.
2. Sizes: Same size as upstream pipe, unless otherwise indicated.
3. Extended stems: Where piping insulation is indicated or specified, valves shall be equipped with 2" extended handles of non-thermal conductive material. Also provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Supply with memory stops, which are fully adjustable after insulation is applied.
4. End Connection: 2 inch and under shall be threaded, 2-1/2 inches and larger shall be flanged or full lug style.

C. Valves for Potable Water must comply with California Lead Free Law, effective January 1, 2010.

1. "Lead Free" refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%. Source: California Health & Safety Code (116875).
2. All valves must be 3rd party certified.
3. Bronze valves shall be made with dezincification-resistant material.

D. Where possible, valves of one manufacturer shall be used.

E. Provide Class 150 valves meeting the valve specifications where Class 125 valves are specified but are not available.

F. Bronze valves shall be made with dezincification-resistant materials, (Bronze ASTM B62, B61, or B584 Alloy C87850). This includes body, ball, stem and / or trim.

G. Bronze Valves: NPS 2 and smaller with threaded ends, unless otherwise indicated.

H. Ferrous Valves: NPS 2-1/2 and larger with flanged ends, unless otherwise indicated.

I. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

J. Valve Sizes: Same as upstream piping unless otherwise indicated.

K. Valve Actuator Types:

1. Hand-wheel: For valves other than quarter-turn types.
2. Hand-lever: For quarter-turn valves NPS 6 and smaller.

L. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or

disturbing insulation and memory stops that are fully adjustable after insulation is applied.

a. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Nib-seal handle extension or comparable product by one of the following:

b. General valves:

1) NIBCO
2) Hammond
3) Milwaukee

c. Below grade domestic water shut-off valves (gate valves) 2" and larger:

1) NIBCO.
2) Clow.
3) Mueller.

d. Butterfly Valves:

1) NIBCO.
2) Demco.
3) Dezuric.

e. Plug Valves:

1) Hammond.
2) Milwaukee.

f. Check valves, lift type:

1) Hammond.
2) Milwaukee.

2. Butterfly Valves: With extended neck.

M. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves, ASME B16.5 for steel valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

N. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim & Nib-Seal Handle:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-595-Y-66-LF or T-595-Y-66-LF or a comparable product by one of the following,

a. Milwaukee Valve Company.
b. Apollo.

2. Description:

c. Standard: MSS SP-110, NSF 61-G.
d. CWP Rating: 600 psig.
e. Body Design: Three piece with threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing.
f. Body Material: Bronze ASTM B 584 Alloy C87850 or C87600.
g. Ends: Threaded or Solder.
h. Seats: PTFE or TFE.
i. Stem: 316 Stainless steel.
j. Ball: 316 Stainless steel, vented.
k. Port: Full.

B. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim & Nib-Seal Handle:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-585-66-LF or T-585-66-LF or a comparable product by one of the following:

a. Conbraco Industries, Inc.; Apollo Div.
b. Milwaukee Valve Company.

2. Description:

a. Standard: MSS SP-110, NSF 61-G.
b. CWP Rating: 600 psig.
c. Body Design: Two piece with threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing.
d. Body Material: Bronze ASTM B 584 Alloy C87600.
e. Ends: Threaded or Solder.
f. Seats: PTFE or TFE.
g. Stem: 316 Stainless steel.
h. Ball: 316 Stainless steel, vented.
i. Port: Full.

C. 200 CWP, Sizes 2-1/2" – 24", Ductile Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model LD-2000-3/5, or a comparable product by one of the following:

a. Cooper Cameron Corp.; Cooper Cameron Valves Div.
b. Tyco International, Ltd.; Tyco Valves & Controls

2. Description:

a. Standard: MSS SP-67, Type I, IAPMO.
b. NPS 24 (DN 300) and Smaller CWP Rating: 200 psig (1380 kPa).
c. Body Design: Full Lug type; Bubble tight shutoff, suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 536, ductile iron.
e. Seat: EPDM.
f. Stem: One- or two-piece stainless steel.

g. Disc: Aluminum bronze

D. Retain one or more of six paragraphs in this article if iron, single-flange butterfly valves are required. MSS SP-67 covers iron, single-flange butterfly valves NPS 1-1/2 to NPS 72.

2.3 BRONZE LIFT CHECK VALVES

A. Class 125, Lift Check Valves with Nonmetallic TFE Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-480-Y-LF or T-480-Y-LF or a comparable product by one of the following:

a. Hammond.
b. Milwaukee.

2. Description:

a. Standard: MSS SP-80, Type 2, NSF 61-G.
b. CWP Rating: 200 psig.
c. Body Design: Vertical flow.
d. Body Material: ASTM B 584 Alloy C87850, lead free bronze.
e. Ends: Threaded or Solder.
f. Disc: PTFE, or TFE.

2.4 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Nonmetallic TFE Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-413-Y-LF or T-413-Y-LF or a comparable product by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Powell Valves.

2. Description:

a. Standard: MSS SP-80, Type 4, NSF 61-G.
b. CWP Rating: 200 psig.
c. Body Design: Y-pattern Horizontal flow.
d. Body Material: ASTM B 584 Alloy C87850, lead free bronze.
e. Ends: Threaded or Solder.
f. Disc: PTFE or TFE.

2.5 BRONZE GATE VALVES

A. NRS Bronze Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-113-LF or T-113-LF or a comparable product by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Powell Valves.

2. Description:

a. Standard: MSS SP-139, Type 2, NSF 61-G.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 584, dezincification-resistant bronze with integral seat and threaded bonnet.
d. Ends: Threaded or Solder.
e. Stem: Lead free Silicon Bronze.
f. Disc: Solid wedge; lead free bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron.

B. RS Bronze Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-111-LF or T-111-LF or a comparable product by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Powell Valves

2. Description:
a. Standard: MSS SP-80, Type 2, NSF 61-G.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B584 C87850 dezincification resistant bronze with integral seat and threaded bonnet.
d. Ends: Threaded or Solder.
e. Stem: Lead free silicon bronze.
f. Disc: Solid wedge, lead free bronze.
g. Packing: Asbestos free.
h. Handwhell: Malleable iron.

2.6 IRON GATE VALVES

A. Class 125, Ductile-Iron Resilient Wedge Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F-619-RWS (NRS) or F-607-RWS (OS&Y) or a comparable product by one of the following:

a. Clow
b. Mueller

2. Description:

a. Standard: AWWA C-509 and C-515,
b. CWP Rating: 300 psig.
c. Body Material: ASTM A-536 ductile iron, fusion-bonded epoxy coating inside and out.
d. Ends: Flanged.
e. Trim: stainless steel.
f. Disc: Rubber encapsulated ductile iron wedge.
g. Packing and Gasket: Asbestos free.

2.7 MANUAL CIRCUIT BALANCING VALVES

A. Bronze, Fixed Orifice, Balancing Valves (2” and smaller):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T/S-1810-LF or a comparable product by one of the following:

a. Or approved equal

2. Description:

a. CWP Rating: 300 psig
b. Maximum Operating Temperature: 260°F.
c. Body Material: Bronze or dezincification-resistant brass, lead free, Y-pattern globe type with fixed orifice (venture) for precise regulation and control. NO QUARTER TURN VALVES WILL BE ACCEPTED.
d. Plug: Bronze or dezincification-resistant brass with EPDM O-Rings.
e. Seat: Bronze or dezincification-resistant brass.
f. Ends: Threaded or Solder.
g. Pressure Gage Connections: Shall have two metering test ports with internal check and protective caps for use with portable differential pressure metering stations.
h. Handle Style: Calibrated hand wheel equipped with visual position readout and hidden memory stops for repeatable regulation and control.

B. Cast-Iron or Steel, Calibrated-Orifice, Balancing Valves (2-1/2” and larger):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F/G 737A or a comparable product by one of the following:

a. Tour & Andersson

2. Description:

a. CWP Rating: 240 psig
b. Maximum Operating Temperature: 250°F.
c. Body Material: Cast-iron or steel body, globe pattern with calibrated orifice. NO BUTTERFLY VALVES.
d. Stem Seals: EPDM O-Rings
e. Disc: EPDM coated cast-iron disc.
f. Seat: Bronze or dezincification brass.
g. Ends: Flanged or grooved.
h. Pressure Gage Connection: Integral seals for portable differential pressure meter.
i. Handle Style: Calibrated hand wheel equipped with visual position readout and concealed memory stops for repeatable regulation and control.

2.8 GAS SHUT-OFF COCKS:

A. Gas Shut-Off Cocks, Above Grade (4” and smaller):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T-FP-600-A or a comparable product by one of the following:

a. Or approved equal.

2. Description:

a. Standard: MSS SP-110
b. CWP Rating: 600 psig.
c. SWP Rating: 150 psig.
d. Gas Rating: CSA certified and UL/FM listed.
e. Body Design: Two piece with threaded body pack nut design (no threaded stem designs al-lowed) with adjustable stem packing.
f. Body Material: Dezincification-resistant brass.
g. Seats: PTFE
h. Ball: Chrome-plated brass
i. Ends: Threaded
j. Port: Full

B. Gas Shut-Off Cocks, Below Grade:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Nordstom "Poly-Gas" or comparable product by one of the following:

a. Or approved equal.

2. Description:

a. Standards: ASTM D-2513 and ANSI B16.40
b. Valve boxes: cast iron tops marked "GAS", high-impact heavy-duty ABS valve can as manufactured by C.O. Test Services-VALVCO, Inc. or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly valves.
2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
3. Throttling Service: Ball or Butterfly valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends.
3. For Steel Piping, NPS 2 and Smaller: Threaded ends.
4. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze Valves: Threaded ends.
2. Ball Valves: Two piece, full port, bronze with stainless-steel trim.
3. Bronze Lift Check Valves: Class 125, nonmetallic TFE disc.
4. Bronze Swing Check Valves: Class 150, nonmetallic TFE disc.
5. Bronze Gate Valves: Class 150, RS.

B. Pipe NPS 2-1/2 and Larger:

1. Ductile-Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, aluminum-bronze disc.

END OF SECTION 22 05 23

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper

operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.6 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.7 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.8 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.9 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.13 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.14 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.15 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include

locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.16 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 Pipe Supports: Unless otherwise indicated on the drawings, shall be as follows:

A. The Contractor shall furnish and install all miscellaneous iron work including angles, channels, etc., required to appropriately support the various piping systems. Hanger spacing and location shall conform to 2019 California Plumbing Code Table 313.1.

B. All horizontal runs of piping within the building to be supported from the structural framing with steel rods and split ring hangers, B-Line, Grinnell Company, Tolco, or approved equal. Steel rods shall be secured to overhead framing with side beam connectors. Where necessary, install angle iron between framing to accommodate hanger rods. Where several pipes are running together, Unistrut, B-Line or Powerstrut channels with clamps may be used in lieu of individual pipe hangers, and supported from structure as herein specified. Submit test data for type of hanger supports to be provided. For support conditions other than specified herein, the Contractor shall submit method of support for approval prior to any installation.

C. Horizontal Piping Hangers and Supports:

1. General: Provide factory fabricated horizontal hangers and supports complying with one of the following MSS types listed to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

a. Adjustable Steel Clevis Hangers: (MSS Type 1.) B-Line B 3100
b. Adjustable Swivel Pipe Rings: (MSS Type 5) B-Line B3690

D. Vertical-Piping Clamps:

1. General: Provide factory fabricated vertical-piping clamps complying with the following types listed, to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.
2. Two-Bolt Riser Clamps: (MSS Type 8) B-Line B3373

E. Hanger-Rod Attachments:

1. General: Provide factory fabricated hanger-rod attachments B-Line, Tolco or approved equal, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-58 and manufacturer's published product information. Select size of hanger-rod attachment to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
2. Side beam eye socket, Tolco Fig. #57 for rod sizes 3/8" dia. and Tolco Fig. #25-30-251 for rod sizes 1/2" dia.

F. Building Attachments:

1. General: Provide factory fabricated building attachments, selected by Installer to suit building structural framing conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

G. Hanger Rods and Spacing shall conform to the following table:

Pipe Sizes	Spacing	Rods
2 Inch and Smaller	6 Feet	3/8 Inch
2-1/2 Inch to 3 Inch	8 Feet	1/2 Inch
4 Inch and larger	8 Feet	5/8 Inch

H. Hangers and Supports shall be adequate to maintain alignment and prevent sagging and shall be placed within 18 inches of joint. Support shall be provided at each horizontal branch connection.

I. Provide lateral bracing as manufactured by B-Line or approved equal for all piping to prevent swaying or movement in accordance with SMACNA "Guidelines for Seismic Restraints of Piping Systems". Piping smaller than indicated in the guidelines shall be provided with bracing as specified for the smallest size indicated. The entire water distribution system shall be properly braced and will not move due to the action of quick closing of valves.

J. Miscellaneous Supports, Wall Brackets, Etc.: Provide where required in accordance with the best standard practices of the trade. Submit shop drawings for all fabricated supports.

2.2 Isolators. All piping which is not isolated from contact with the building by its insulation shall be installed with a manufactured type isolator. Isolators shall be B-Line vibra clamp and cushion, Super Strut, Stoneman "Trisolator", or approved equal. Piping shall be installed and supported in a manner to provide for expansion without strains. Guides shall be properly installed to ensure this requirement.

2.3 Shields:

A. General: Provide shields at piping hangers and supports, factory-fabricated, for all insulated piping as manufactured by Pipeshields Incorporated or approved equal. Size shields for exact fit to mate with pipe insulation.

1. Protection Shields: MSS Type 40; provide high density insert of same thickness of insulation or equal 100-psi average compressive strength, waterproofed calcium silicate, encased with a sheet metal shield. Insert and shield shall cover entire circumference of the pipe and shall be of length indicated by manufacturer for pipe size and thickness of insulation.

2.4 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.5 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.6 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ERICO International Corporation.
2. PHS Industries, Inc.
3. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
4. Piping Technology & Products, Inc.

B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig ASTM C 552 or Type II cellular glass with 100-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.7 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

L. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.

4. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099123 "Interior Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
4. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. C-Clamps (MSS Type 23): For structural shapes.
6. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
7. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
8. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
9. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 22 05 29

SECTION 22 05 53

IDENITIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Valve tags.
5. Warning tags.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

F. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
c. Include all pertinent construction, installation, performance and technical data.
d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

G. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish

procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

H. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 incheshigh.

2.4 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.5 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Section 099123 "Interior Painting."

B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Pipe Label Color Schedule:

1. Domestic Water Piping:

a. Background Color: White.
b. Letter Color: Black.

2. Sanitary Waste and Storm Drainage Piping:

a. Background Color: White.
b. Letter Color: Black.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 1-1/2 inches, round.
b. Hot Water: 1-1/2 inches, round.

2. Valve-Tag Color:

a. Cold Water: Natural.
b. Hot Water: Natural.

3. Letter Color:

a. Cold Water: Black.
b. Hot Water: Black.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 22 05 53

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Supplies and drains for handicap-accessible lavatories and sinks.

B. Related Sections:

1. Section 220716 "Plumbing Equipment Insulation."

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.11 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.12 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.13 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.14 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.15 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.16 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.17 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.18 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Hot Water Pipe Insulation: All hot water supply and return piping, except exposed connections to plumbing fixtures, flanges and unions shall be insulated with ASTM C547, Class I, "Johns-Manville" "Micro-Lock" 850-APT, Owens-Corning Fiberglass Corp., ASJ/SL-11 or approved equal, 1" thick for sizes up to 2" and 1-1/2" thick for sizes 2" and larger with “Johns-Manville” “Zeston” pre-formed insulation inserts for all fittings. Insulation at all fittings shall be equal in

thickness to insulation for piping. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2019 CMC

1. Exposed insulated piping in occupied areas and exposed outside the building shall be covered with Johns-Manville" "Zeston" 30-mil thick white PVC jacketing material per ASTM D1784 with "Johns-Manville" "Zeston" pre-formed insulation inserts for all fittings. Insulation at all fittings shall be equal in thickness to insulation for piping. Jacketing shall comply with ASTM E84, and shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2019 CMC.
2. Hot water piping below slab shall have insulation protected by a 10-mil thick polyethylene plastic sleeve sealed watertight with poly vinyl chloride tape.

B. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

C. Products shall not contain asbestos, lead, mercury, or mercury compounds.

D. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

E. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

F. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

G. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Johns Manville; Micro-Lok.
   b. Knauf Insulation; 1000-Degree Pipe Insulation.
   c. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

H. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Armacell LLC; Tubolit.
   b. Nomaco Insulation; IMCOLOCK and NOMALOCK.

I. Condensate Pipe Insulation: All condensate piping within the building shall be insulated with "Imcoa" "Imcolock" ¾" nominal wall thickness closed-cell insulation. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2019 CMC. All joints shall be mitered and secured with black duct tape.

J. All insulation shall be continuous through supports and hangers.

K. All fixtures complying with the provisions of the Americans with Disabilities Act shall be provided with Prowrap insulation for exposed hot water pipe, tailpiece, and trap as manufactured by McGuire, and secured per manufacturers recommendations. No tape wrapping shall be permitted.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Phenolic Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.
b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-33.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide the following:

a. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 428 AWF ASJ.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
c. Compac Corporation; 104 and 105.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 370 White PVC tape.
b. Compac Corporation; 130.
c. Venture Tape; 1506 CW NS.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

2.4 SECUREMENTS

A. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

2.5 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers,:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. McGuire Manufacturing.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and

unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Hot and Recirculated Hot Water:

1. NPS 1-1/4 and Smaller: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

2. NPS 1-1/2 and Larger: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

B. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

1. All Pipe Sizes: Insulation shall be the following:

a. McGuire pre-insulated trap and supply covers.

END OF SECTION 22 07 19

SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.
2. Encasement for piping.

B. Related Requirements:

1. Section 221113 "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Domestic Water: The Contractor shall be responsible for the domestic water service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite domestic water system.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.12 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.13 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

1.14 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of water service.
2. Do not interrupt water service without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

E. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

F. Piping within the building and above grade shall be Type "L" ASTM B88, hard drawn copper tubing with wrought copper sweat fittings ANSI B16.18 and B16.22,

G. Outdoor underground piping in sizes 2-1/2" and 3" shall be Type "L" ASTM B88, hard drawn copper as specified for water piping within the building. Piping 2" and smaller shall be Type "K" ASTM B88, hard drawn copper with wrought copper sweat fittings ANSI B16.18 and B16.22.

H. Piping below the building floor shall be Type "K" soft annealed copper tubing with no fittings below the slab.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 VALVE ACCESSORIES AND SPECIALTIES

A. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.

1. For service shut-off valves on domestic water; for pressure regulator assemblies, shall be Brooks Products or Fraser Cement Products Co., rectangular concrete type with vandal-proof cast iron cover and name of service clearly marked on cover. Box shall be of size to permit full range of valve operation and to permit easy removal of valve assembly. Vaults shall be sectional type
2. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

2.5 CORROSION PROTECTION:

1. General.

a. Corrosion protection shall be provided for all below grade copper piping and associated valves and fittings. Such piping shall be protected from corrosion by encasement in a polyethylene protective wrapping, referred to hereafter as polywrap. Although not intended to be a completely air and water tight enclosure, the polywrap shall provide a continuous barrier between the pipe and surrounding bedding and backfill.

2. Materials.

a. Copper piping encasement.

1) The polywrap shall be minimum 6 mil. in thickness, group 2, linear low density, flat tube, natural (clear) virgin polyethylene film formed into tubes or sheets as required. Material shall conform to the requirements of ASTM D1248.
2) The polywrap shall be as manufactured by Northtown Company or approved equal.

b. The minimum Polywrap flat tube width for each pipe diameter shall be as follows:

Pipe Size / Type	Polywrap Flat Tube Width
½” to ¾” copper	2”
1” to 1-½ copper	3”
2” copper	4”
2-1/2” copper	5”
3” copper	6”

c. The polywrap shall be secured as specified with 2 inch wide pressure sensitive plastic tape not less than 10 mils thick.

1) Tape shall be Scotchwrap No. 50, Polyken No. 900, Tapecoat CT, Johns-Manville No. V-10 Trantex or approved equal.

d. Piping through exterior walls shall be sealed using Link Seal modular seal with nitrile seal elements and stainless steel bolts.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105/A21.5.

D. Install shutoff valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install domestic water piping level without pitch and plumb.

G. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

H. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

J. Install piping to permit valve servicing.

K. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

L. Install piping free of sags and bends.

M. Install fittings for changes in direction and branch connections.

N. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

O. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

S. Corrosion Protection:

1. The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the pipe sections. Slip the tube around the pipe, centering it to provide a 1-ft overlap on each adjacent pipe section, and bunching it accordion fashion lengthwise until it clears the pipe ends. Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at each joint to facilitate installation of the poly-wrap. The bunched-up poly-wrap shall be pulled from the preceding length of pipe, slipped over the end of the new length of pipe, and secured in place with one circumferential turn of tape plus enough overlap to assure firm adhesion. The end of the poly-wrap shall be slipped from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe and tape it in place. The loose wrapping on the barrel of the pipe shall be pulled snugly around the barrel of the pipe and excess material folded over the top of the pipe and the folds held in place by means of short strips of adhesive tape, at about 3 foot intervals along the pipe.
2. Rips, punctures or other damage to the tube shall be repaired with the adhesive tape or pieces of tube material secured with tape. Bends and reducers in the line shall be covered with polyethylene in the same manner as pipe.
3. Valves, tees, crosses and outlets shall be wrapped with flat sheets of the same material. The sheets shall be passed under valves and brought up around the body to the stem. Edges shall be brought together, folded twice and secured with the adhesive tape.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: 72 inches with 3/8-inch rod.
2. NPS 2-1/2 to NPS 3: 8 feet with 1/2-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.5 CONCRETE VAULT INSTALLATION

A. Install precast concrete vaults according to ASTM C 891.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 PIPE AND EQUIPMENT IDENTIFICATION

A. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified and area served, complete with hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1-1/2") in diameter.

B. All piping systems shall be readily identifiable by appropriate labeling with the name of the piping contained. Such labeling shall be by means of metal tags, stenciling, stamping, or with adhesive markers, in a manner that is not readily removable. Labeling shall appear on the piping at intervals of not more than 20 ft and at least once in each room and each story traversed by the piping system.

C. Provide on exterior wall of each building opposite the building's main gas service a sign reading "Gas Shut Off". Sign shall be metal with minimum 1-1/2" high-embossed letters.

1. All equipment shall be provided with name plate indicating all pertinent information on it

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

Schedule of Test Pressures:

System Tested	Gauge	Test	Duration
Water	100 PSI	Water	4 Hours

e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.

8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours. Operate all valves during the retention period.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours. Operate all valves during the retention period.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.11 OPERATION INSTRUCTION

A. Prior to occupancy or prior to the date of final inspection, whichever may occur first, the Contractor shall prepare two (2) sets of typewritten instructions for the operation of all equipment, valves, etc., specified and furnished as a part of the work under this section, and shall assign a competent person, thoroughly familiar with the job, to demonstrate and instruct a representative of the Owner in the operation of the equipment. The time of said demonstration and instructions shall be arranged with the Owner's representative approximately one (1) week in advance. Verbal instructions shall include shut-off location of gas and water. The Contractor shall assemble all operation and maintenance data supplied by the manufacturers of the various pieces of equipment, all keys and special wrenches required to operate and service the equipment (including keys for yard boxes, gas stops and fixture stops), and all equipment warranties and deliver same to the representative of the Owner on date of said instructions.

3.12 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping, NPS 3 and smaller, shall be the following:

1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.

E. Under-building-slab, domestic water piping, NPS 2 and smaller, shall be the following:

1. Soft copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.

F. Aboveground domestic water piping shall be the following:

1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.

3.13 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves for piping NPS 2 and smaller. Use butterfly valves with flanged ends for piping NPS 2-1/2 and larger.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 22 11 16

SECTION 22 11 19

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Temperature-actuated, water mixing valves.
6. Hose bibbs.
7. Water-hammer arresters.
8. Trap-seal primer valves.
9. Trap-seal primer systems.

B. Related Requirements:

1. Section 223200 "Domestic Water Filtration Equipment" for water filters in domestic water piping.
2. Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.
3. Section 224300 "Medical Plumbing Fixtures" for thermostatic mixing valves for sitz baths, thermostatic mixing-valve assemblies for hydrotherapy equipment, and outlet boxes for dialysis equipment.
4. Section 224500 "Emergency Plumbing Fixtures" for water tempering equipment.
5. Section 224713 "Drinking Fountains" for water filters for water coolers.
6. Section 224716 "Electric Water Coolers" for water filters for water coolers.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Domestic Water: The Contractor shall be responsible for the domestic water service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite domestic water system.

E. Domestic Water Service: The Contractor shall arrange with the serving utility company for the installation of all water meter assemblies and reduced pressure backflow devices, including the service mains and vaults, and all required appurtenances as indicated on the drawings and in accordance with serving utility standards and shall pay all costs incurred. All required capacity fees, frontage fees and inspections, shall be paid for by the Owner. Contractor shall provide necessary tap-in connections in water main for sterilizing of domestic water system. Contractor shall connect into the main water service line as indicated on the drawings. The installation shall be in accordance with the serving utility company's standards.

1.9 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during

installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.

c. Include all pertinent construction, installation, performance and technical data.
d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.14 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.15 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.16 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 and NSF 14.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 WATER PRESSURE-REDUCING VALVES

A. Water Regulators:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    b. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.

3. Standard: ASSE 1003.
4. Pressure Rating: Initial working pressure of 150 psig (1035 kPa).
5. Size: See plans.
6. Design Flow Rate: See plans.
7. Design Inlet Pressure: See plans.
8. Design Outlet Pressure Setting: See plans.
9. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).
10. Valves for Booster Heater Water Supply: Include integral bypass.
11. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).

B. Water-Control Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Watts; a division of Watts Water Technologies, Inc.; Control Valves (Watts ACV).
    b. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.

3. Description: Pilot-operated, diaphragm-type, single-seated, main water-control valve.
4. Pressure Rating: Initial working pressure of 150 psig (1035 kPa) minimum with AWWA C550 or FDA-approved, interior epoxy coating. Include small pilot-control valve, restrictor device, specialty fittings, and sensor piping.

5. Main Valve Body: Cast- or ductile-iron body with AWWA C550 or FDA-approved, interior epoxy coating; or stainless-steel body.

    a. Size: See plans.
    b. Trim: Stainless steel.

6. Design Flow: See plans.
7. Design Inlet Pressure: See plans.
8. Design Outlet Pressure Setting: See plans.
9. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.

2.4 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 3/4 threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Include operating key with each operating-key hose bibb.

2.5 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Precision Plumbing Products, Inc.
    b. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.6 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. MIFAB, Inc.
    b. Precision Plumbing Products, Inc.
    c. Sioux Chief Manufacturing Company, Inc.

2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.7 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Precision Plumbing Products, Inc.

2. Standard: ASSE 1044.
3. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing.
4. Cabinet: Surface-mounted steel box with stainless-steel cover.
5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.

a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

6. Vacuum Breaker: ASSE 1001.
7. Number Outlets: Four.
8. Size Outlets: NPS 1/2.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install water-hammer arresters in water piping according to PDI-WH 201.

B. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

C. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 Access Panels:

A. Wall access panels shall be minimum 12" x 12" for concealed valves and other equipment unless otherwise specified or indicated. Ceiling access panels shall be 18" x 18" minimum. Access panels shall be located and positioned for ready access and service of equipment

housed within. Where access panels are specified with keyed cylinder locks, all such locks shall be identically keyed.

1. Wall, Non-Fire Rated: Elmdor/Stoneman DW-SS-CL, drywall, stainless steel finish, cylinder lock.
2. Ceiling, Non-fire Rated: Elmdor/Stoneman DW, drywall, prime coated finish, screwdriver latch.
3. Wall, Fire Rated: Elmdor/Stoneman FR-SS-CL, fire rated, stainless steel finish, cylinder lock.
4. Ceiling, Fire rated: Elmdor/Stoneman FRC, Fire rated, prime coated finish, return latch.

3.3 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.4 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
   1. Supply-type, trap-seal primer valves.
   2. Trap-seal primer systems.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

A. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

3.6 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 22 11 19

SECTION 22 12 23

FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.
6. Concrete bases.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).

2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig minimum unless otherwise indicated.

B. Natural-Gas System Pressure within Buildings: 0.5 psig or less.

1.7 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.8 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.9 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Gas Service and Meter Assembly: The Contractor shall arrange with the serving utility company to verify if the existing gas service and meter is adequate for the new addition gas load. If the contractor verifies if the service and meter is not adequate, he shall notify the Architect immediately in writing.

1.10 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.11 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.12 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.13 SUBMITTAL DATA

A. Product Data: For each type of the following:

1. Piping specialties.
2. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
3. Pressure regulators. Indicate pressure ratings and capacities.
4. Dielectric fittings.

B. Submittal Requirements:
1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.

2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

C. Substitution Requirements:

1. Product Data: For each type of the following:

a. Piping specialties.
b. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
c. Pressure regulators. Indicate pressure ratings and capacities.
d. Dielectric fittings.

2. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

3. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
4. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
5. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were

selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

6. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.14 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.15 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

D. Protect stored PE pipes and valves from direct sunlight.

1.16 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of natural-gas service.
2. Do not proceed with interruption of natural-gas service without Construction Manager's written permission.

1.17 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 Gas Piping:

A. Concealed gas piping within the building shall be Schedule 40 black steel pipe conforming to ASTM A-53 using 150 pound banded malleable iron screwed fittings for piping 2" and smaller and weld type steel fittings for piping 2-1/2" and larger.

B. Exposed gas piping outside the building shall be Schedule 40 galvanized steel pipe conforming to ASTM A-53 using galvanized 150 pound banded galvanized malleable iron screwed fittings for piping in sizes 2" and smaller and seamless weld type steel fittings for all piping in sizes 2-1/2" and larger.

C. Underground gas piping shall be SDR-11 Polyethylene PE2406 (Yellow) as manufactured by Driscoplex. Fittings shall be socket fusion weld Polyethylene as manufactured by Performance Pipe or Central, PE2406 (Yellow) complying with ASTM, D2513. Where required provide "Lyco" or Double "O" seal transition fittings between steel and polyethylene as manufactured by Central, all identified and approved for gas service. A 14 gauge copper tracer wire shall be installed with and attached to piping and shall terminate above grade at each end. Underground polyethylene piping shall be installed by personnel certified by the pipe manufacturer as having received instructions directly from the pipe manufacturer's field representative. Contractors not having certified personnel will be required to have a factory representative of the pipe manufacturer visit the site at the time of underground pipe installation and provide the required instructions. All required cost for training and certification shall be paid for by Contractor.

1. Upon completion of the gas piping underground installation, Contractor shall submit a written report directly to the Architect stating that all materials installed are as specified and approved, and that installation was performed by factory certified personnel and tested to 60 P.S.I.
2. All piping on roof shall be supported by pipe supports as manufactured by MAPA Products. Products by Miro Industries and Erico shall be accepted for submittal review.

    a. Pressurized Piping:
        1) For pipe sizes 1” and less: MS-1 single post, adjustable height pipe support.
        2) For pipe sizes 2 ½” and less: MS-4 adjustable, roller pipe support.
        3) For pipe sizes 4” and less: MS-5 adjustable, roller pipe support.
    b. Gravity System Piping 2” and Less: MS-1 single post, adjustable height pipe support.
3. All underground non-metallic piping shall have 14 gauge copper "Tracer Wire" continuous for entire length.

2.2 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.

4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

    a. Material Group: 1.1.
    b. End Connections: Threaded or butt welding to match pipe.
    c. Lapped Face: Not permitted underground.
    d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

    Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.

    f. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

B. PE Pipe: ASTM D 2513, SDR 11.

1. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.
2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
3. Anodeless Service-Line Risers: Factory fabricated and leak tested.

    a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet.
    b. Aboveground Portion: PE transition fitting.
    c. Outlet shall be threaded or flanged or suitable for welded connection.
    d. Tracer wire connection.
    e. Ultraviolet shield.
    f. Stake supports with factory finish to match steel pipe casing or carrier pipe.

4. Transition Service-Line Risers: Factory fabricated and leak tested.

    a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet connected to steel pipe complying with ASTM A 53/A 53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
    b. Outlet shall be threaded or flanged or suitable for welded connection.
    c. Bridging sleeve over mechanical coupling.
    d. Factory-connected anode.
    e. Tracer wire connection.
    f. Ultraviolet shield.
    g. Stake supports with factory finish to match steel pipe casing or carrier pipe.

5. Plastic Mechanical Couplings,NPS 1-1/2 and Smaller: Capable of joining PE pipe to PE pipe.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Lyall, R. W. & Company, Inc.
        2) Mueller Co.; Gas Products Div.
        3) Perfection Corporation; a subsidiary of American Meter Company.

b. PE body with molded-in, stainless-steel support ring.
c. Buna-nitrile seals.
d. Acetal collets.
e. Electro-zinc-plated steel stiffener.

6. Steel Mechanical Couplings: Capable of joining plain-end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Dresser Piping Specialties; Division of Dresser, Inc.
2) Smith-Blair, Inc.

b. Stainless-steel flanges and tube with epoxy finish.
c. Buna-nitrile seals.
d. Stainless-steel bolts, washers, and nuts.
e. Factory-installed anode for steel-body couplings installed underground.

2.3 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
3. Corrugated stainless-steel tubing with polymer coating.
4. Operating-Pressure Rating: 0.5 psig.
5. End Fittings: Zinc-coated steel.
6. Threaded Ends: Comply with ASME B1.20.1.

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

B. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.4 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.5 MANUAL GAS SHUTOFF VALVES

A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.

1. CWP Rating: 125 psig.
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. McDonald, A. Y. Mfg. Co.
    b. Nibco.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Bronze Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Lee Brass Company.
    b. McDonald, A. Y. Mfg. Co.

2. Body: Bronze, complying with ASTM B 584.
3. Plug: Bronze.
4. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Operator: Square head or lug type with tamperproof feature where indicated.
6. Pressure Class: 125 psig.
7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

F. PE Ball Valves: Comply with ASME B16.40.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Kerotest Manufacturing Corp.
    b. Lyall, R. W. & Company, Inc.
    c. Perfection Corporation; a subsidiary of American Meter Company.
2. Body: PE.
3. Ball: PE.
4. Stem: Acetal.
5. Seats and Seals: Nitrile.
6. Ends: Plain or fusible to match piping.
7. CWP Rating: 80 psig.
8. Operating Temperature: Minus 20 to plus 140 deg F.
9. Operator: Nut or flat head for key operation.
10. Include plastic valve extension.

G. Valve Boxes:

1. Yard Boxes & Vaults: For service shut-off valves on gas, shall be Brooks Products or Fraser Cement Products Co., rectangular concrete type with vandal-proof cast iron cover and name of service clearly marked on cover. Box shall be of size to permit full range of valve operation and to permit easy removal of valve assembly. Vaults shall be sectional type.
2. Cast-iron, two-section box.
3. Top section with cover with "GAS" lettering.
4. Bottom section with base to fit over valve and barrel a minimum of 5 inches in diameter.
5. Adjustable cast-iron extensions of length required for depth of bury.
6. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.

2.6 EARTHQUAKE VALVES

A. Earthquake Valves: Comply with ASCE 25.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Pacific Seismic Products, Inc.

2. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction.
3. Maximum Operating Pressure: 0.5 psig.
4. Cast-aluminum body with stainless-steel internal parts.
5. Nitrile-rubber, reset-stem o-ring seal.
6. Valve position, open or closed, indicator.
7. Composition valve seat with clapper held by spring or magnet locking mechanism.
8. Level indicator.
9. End Connections: Threaded for valves NPS 2 and smaller; flanged for valves NPS 2-1/2 and larger.

2.7 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Meter Company.
b. Fisher Control Valves and Regulators; Division of Emerson Process Management.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 5psig.

2.8 Access Panels:

A. Wall access panels shall be minimum 12" x 12" for concealed valves and other equipment unless otherwise specified or indicated. Ceiling access panels shall be 18" x 18" minimum. Access panels shall be located and positioned for ready access and service of equipment

housed within. Where access panels are specified with keyed cylinder locks, all such locks shall be identically keyed.

1. Wall, Non-Fire Rated: Elmdor/Stoneman DW-SS-CL, drywall, stainless steel finish, cylinder lock.
2. Ceiling, Non-fire Rated: Elmdor/Stoneman DW, drywall, prime coated finish, screwdriver latch.
3. Wall, Fire Rated: Elmdor/Stoneman FR-SS-CL, fire rated, stainless steel finish, cylinder lock.
4. Ceiling, Fire rated: Elmdor/Stoneman FRC, Fire rated, prime coated finish, return latch.

2.9 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to NFPA 54 to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with NFPA 54 requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Install underground, PE, natural-gas piping according to ASTM D 2774.

C. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
3. Replace pipe having damaged PE coating with new pipe.

D. Install fittings for changes in direction and branch connections.

3.4 INDOOR PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Verify final equipment locations for roughing-in.

K. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

L. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

M. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

N. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

O. Concealed Location Installations:

1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
2. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.

    a. Exception: Tubing passing through partitions or walls does not require striker barriers.

3. Prohibited Locations:

    a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
    b. Do not install natural-gas piping in solid walls or partitions.

P. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

Q. Connect branch piping from top or side of horizontal piping.

R. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

S. Do not use natural-gas piping as grounding electrode.

T. Install strainer on inlet of each line-pressure regulator.

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.5 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

B. Install underground valves with valve boxes.

C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

D. Install earthquake valves aboveground outside buildings according to listing.

3.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

F. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.7 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 2 and Smaller: Maximum span, 6 feet; minimum rod size, 3/8 inch.
2. NPS 2-1/2 to NPS 3-1/2: Maximum span, 8feet; minimum rod size, 1/2 inch.

3.8 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install piping adjacent to appliances to allow service and maintenance of appliances.

C. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.9 LABELING AND IDENTIFYING

A. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for piping and valve identification.

B. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified and area served, complete with hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1-1/2") in diameter.

C. All piping systems shall be readily identifiable by appropriate labeling with the name of the piping contained. Such labeling shall be by means of metal tags, stenciling, stamping, or with adhesive markers, in a manner that is not readily removable. Labeling shall appear on the piping at intervals of not more than 20 ft and at least once in each room and each story traversed by the piping system.

D. Provide on exterior wall of each building opposite the building's main gas service a sign reading "Gas Shut Off". Sign shall be metal with minimum 1-1/2" high-embossed letters.

E. All equipment shall be provided with name plate indicating all pertinent information on it

3.10 PAINTING

A. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Alkyd System: MPI EXT 5.1D.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Exterior alkyd enamel flat.
d. Color: Gray.

B. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the Uniform Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as well.

Schedule of Test Pressures:

System Tested	Gauge	Test	Duration

Gas	60 PSI	Air	4 Hours

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to NFPA 54 and authorities having jurisdiction.
2. Natural-gas piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.12 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

3.13 OUTDOOR PIPING SCHEDULE

A. Underground natural-gas piping shall be:

1. PE pipe and fittings joined by heat fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.

B. Aboveground natural-gas piping in exposed locations shall be one of the following:

1. Galvanized steel pipe with galvanized steel malleable-iron fittings and threaded joints.
2. Galvanized steel pipe with galvanized wrought-steel fittings and welded joints.

3.14 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG

A. Aboveground piping NPS 2 and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground piping NPS 2-1/2 and larger shall be the following:

1. Steel pipe with wrought-steel fittings and welded joints.

3.15 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Piping valves shall be the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.

END OF SECTION 22 11 24

SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections:
1. Section 221313 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging

of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Sanitary Sewer: The Contractor shall be responsible for the soil and waste piping outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite sewer system.

1.9 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of

switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.14 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.15 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Architect's written permission.

1.16 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.17 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.18 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.

C. ASTM C 1540, CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ANACO-Husky SD 4000 series.
b. Clamp All HI_TORQ 125 series

2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Soil and waste piping within the building itself and outside within five feet (5') of the foundation, shall be no-hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall comply with CISPI. Standard 301, ASTM A-888 or ASTM A-74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Fittings shall be made up with "Husky" SD 4000 series or “Clamp All” HI-TORQ 125 series stainless steel type 304 couplings and shall conform to ASTM C1540 & ASTM C564 except all above ground vent pipe fittings may be made with "Anaco" or "Tyler" stainless steel two band couplings conforming to CISPI Standard 310.

2.3 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Cleanouts to Grade: Jay R. Smith No. 4258 or Jay R. Smith No. 4253 with X-H bronze plug and X-X-H non-skid cover with lifting device set flush with surface for concrete areas. Asphalt or nonsurfaced areas shall be installed with ring of concrete poured around the bottom flange six inches (6") below surface. Use cast iron soil pipe on cleanout risers. For cleanouts in non-traffic areas, terminate cleanout plug in concrete yard box
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Smith, Jay R. Mfg. Co.
b. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

3. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
4. Top-Loading Classification(s): Light Duty Medium Duty Heavy Duty and Extra-Heavy Duty.
5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. Yard Boxes & Vaults: For service for cleanouts, shall be Brooks Products or Fraser Cement Products Co., rectangular concrete type with vandal-proof cast iron cover and name of service clearly marked on cover. Box shall be of size to permit full range of valve operation and to permit easy removal of valve assembly. Vaults shall be sectional type.

2.4 CORROSION PROTECTION

A. General.

1. Corrosion protection shall be provided for all below grade cast iron and copper piping and associated valves and fittings. Such piping shall be protected from corrosion by encasement in a polyethylene protective wrapping, referred to hereafter as polywrap. Although not intended to be a completely air and water tight enclosure, the polywrap shall provide a continuous barrier between the pipe and surrounding bedding and backfill.

B. Materials.

1. Cast iron piping encasement.

a. The polywrap shall be minimum 8 mil. in thickness, group 2, linear low density, flat tube, natural (clear) virgin polyethylene film formed into tubes or sheets as required. Material shall meet or exceed the requirements of AWWA C105, ANSI A21.5 and ASTM A674.
b. The polywrap shall be as manufactured by Northtown Company or approved equal.

2. The minimum Polywrap flat tube width for each pipe diameter shall be as follows:

Pipe Size / Type	Polywrap Flat Tube Width
2” to 3” cast iron	14”
4” cast iron	16”
6” cast iron	20”
8” cast iron	24”

3. The polywrap shall be secured as specified with 2 inch wide pressure sensitive plastic tape not less than 10 mils thick.

a. Tape shall be Scotchwrap No. 50, Polyken No. 900, Tapecoat CT, Johns-Manville No. V-10 Trantex or approved equal.

4. Piping through exterior walls shall be sealed using Link Seal modular seal with nitrile seal elements and stainless steel bolts.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.

2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

O. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

P. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

T. Below-grade piping through exterior walls shall be sealed using Link Seal modular seal with nitrile seal elements and stainless steel bolts and sleeves as manufactured by Century Line.

U. Corrosion Protection:

a. The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the pipe sections. Slip the tube around the pipe, centering it to provide a 1-ft overlap on each adjacent pipe section, and bunching it accordion fashion lengthwise until it clears the pipe ends. Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at each joint to facilitate installation of the polywrap. The bunched-up polywrap shall be pulled from the preceding length of pipe, slipped over the end of the new length of pipe, and secured in place with one circumferential turn of tape plus enough overlap to assure firm adhesion. The end of the polywrap shall be slipped from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe and tape it in place. The loose wrapping on the barrel of the pipe shall be pulled snugly around the barrel of the pipe and excess material folded over the top of the pipe and the folds held in place by means of short strips of adhesive tape, at about 3 foot intervals along the pipe.

b. Rips, punctures or other damage to the tube shall be repaired with the adhesive tape or pieces of tube material secured with tape. Bends and reducers in the line shall be covered with polyethylene in the same manner as pipe.

c. Valves, tees, crosses and outlets shall be wrapped with flat sheets of the same material. The sheets shall be passed under valves and brought up around the body to the stem. Edges shall be brought together, folded twice and secured with the adhesive tape.

3.3 JOINT CONSTRUCTION

A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

B. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.

I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.

B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.

C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.

4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the Uniform Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as wellTest for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before

inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping shall be the following:

1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

C. Aboveground, vent piping shall be the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.

D. Underground, soil, waste, and vent piping shall be the following:

1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

END OF SECTION 22 13 16

SECTION 22 13 19

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Floor drains.
3. Trench drains.
4. Miscellaneous sanitary drainage piping specialties.
5. Grease interceptors.

B. Related Requirements:

1. Section 221423 "Storm Drainage Piping Specialties" for storm drainage piping inside the building, drainage piping specialties, and drains.
2. Section 224300 "Medical Plumbing Fixtures" for plaster sink interceptors.
3. Section 334100 "Storm Utility Drainage Piping" for storm draining piping and piping specialties outside the building.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. FOG: Fats, oils, and greases.

C. HDPE: High-density polyethylene plastic.

1.4 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.7 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the

engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.8 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.9 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:

1. Grease interceptors.

B. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

   a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
   b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
   c. Include all pertinent construction, installation, performance and technical data.
   d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

      1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
      2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

   e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as

clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

C. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 INFORMATIONAL SUBMITTALS

A. Manufacturer Seismic Qualification Certification: Submit certification that grease interceptors, accessories, and components will withstand seismic forces defined in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.14 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.15 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.16 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.17 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built

information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.18 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.19 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate size and location of roof penetrations.

1.20 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Cultures: Provide 1-gal. bottles of bacteria culture recommended by manufacturer of FOG disposal systems equal to 200 percent of amount installed, but no fewer than 2 1-gal. bottles.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Zurn
b. JR Smith
c. Watts

2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
3. Size: Same as connected drainage piping
4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Countersunk, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Metal Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn
   b. JR Smith
   c. Watts

2. Standard: ASME A112.36.2M for cast-iron soil pipe with cast-iron ferrule threaded, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Cast-iron soil pipe with cast-iron ferrule Threaded, adjustable housing.
5. Body or Ferrule: Cast iron.
6. Outlet Connection: Threaded.
7. Closure: Brass plug with tapered threads.
8. Adjustable Housing Material: Cast iron with set-screws or other device.
9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
10. Frame and Cover Shape: Round.
11. Top Loading Classification: Heavy Duty.
12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn
   b. JR Smith
   c. Watts

2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Option for drilled-and-threaded plug in first subparagraph below is for a screw for a wall cover plate.
6. Closure: Countersunk, brass plug.
7. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
8. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
9. Wall Access: stainless-steel wall-installation frame and cover.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Zurn
    b. JR Smith
    c. Watts

3. Standard: ASME A112.6.3.
4. Pattern: Floor drain.
5. Body Material: Gray iron.
6. Seepage Flange: Required.
7. Anchor Flange: Required.
8. Clamping Device: Required.
9. Outlet: Bottom.
10. Coating in first subparagraph below is usually used only on sanitary floor drains.
11. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel.
12. Sediment Bucket: Not required.
13. Top or Strainer Material: Nickel bronze.
14. Top of Body and Strainer Finish: Nickel bronze.
15. Top Shape: Round.

2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Vent Caps:

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment Mounting:

1. Install grease interceptors on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 03 30 00 "Cast-in-Place Concrete." Section 03 30 53 "Miscellaneous Cast-in-Place Concrete."
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment"
3. Comply with requirements for vibration isolation devices specified in Section 22 05 48.13 "Vibration Controls for Plumbing Piping and Equipment."

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
1. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
2. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

F. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated.

G. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.

H. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

I. Install through-penetration firestop assemblies in plastic conductors and stacks at floor penetrations.

J. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

K. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

L. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

M. Install vent caps on each vent pipe passing through roof.

N. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

O. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

P. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

Q. Install grease interceptors, venting according to authorities having jurisdiction and with clear space for servicing.
   1. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor
   2. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

R. Install wood-blocking reinforcement for wall-mounting-type specialties.

S. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

A. Comply with requirements in Section 22 13 16 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

D. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
   1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.
   2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
   1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
   2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
   3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 07 62 00 "Sheet Metal Flashing and Trim."

F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
   1. Grease interceptors.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:
   1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.6 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain grease removal devices. Refer to Section 01 79 00 "Demonstration and Training."

END OF SECTION 22 13 19

SECTION 22 14 13

STORM DRAIN PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections:

1. Section 221429 "Sump Pumps" for storm drainage pumps.
2. Section 334100 "Storm Utility Drainage Piping" for storm drainage piping outside the building.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.
2. Storm Drainage, Force-Main Piping: 150 psig.

B. Seismic Performance: Storm drainage piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Storm Drain: The Contractor shall be responsible for the storm drain service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite storm drain system.

1.9 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed

or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

    b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.14 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.15 PROJECT CONDITIONS

A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of storm-drainage service.
2. Do not proceed with interruption of storm-drainage service without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ANACO-Husky SD 4000 series.
b. Clamp All HI_TORQ 125 series.

2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Storm Drain Piping:

1. Concealed storm drain piping within the building itself and outside within five feet (5') of the foundation, shall be no-hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall comply with CISPI. Standard 301, ASTM A-888 or ASTM A-74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Fittings shall be made up with "Husky" SD 4000 series or “Clamp All” HI-TORQ 125 series stainless steel type 304 couplings and shall conform to ASTM C 1540 & ASTM C564.

2.3 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Cleanouts to Grade: Jay R. Smith No. 4258 or Jay R. Smith No. 4253 with X-H bronze plug and X-X-H non-skid cover with lifting device set flush with surface for concrete areas. Asphalt or nonsurfaced areas shall be installed with ring of concrete poured around the bottom flange six inches (6") below surface. Use cast iron soil pipe on cleanout risers. For cleanouts in non-traffic areas, terminate cleanout plug in concrete yard box

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Smith, Jay R. Mfg. Co.
   b. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

3. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
4. Top-Loading Classification(s): Light Duty Medium Duty Heavy Duty and Extra-Heavy Duty.
5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. Yard Boxes & Vaults: For service for cleanouts, shall be Brooks Products or Fraser Cement Products Co., rectangular concrete type with vandal-proof cast iron cover and name of service clearly marked on cover. Box shall be of size to permit full range of valve operation and to permit easy removal of valve assembly. Vaults shall be sectional type.

2.4 CORROSION PROTECTION:

1. General.

   a. Corrosion protection shall be provided for all below grade cast iron piping and associated valves and fittings. Such piping shall be protected from corrosion by encasement in a polyethylene protective wrapping, referred to hereafter as polywrap. Although not intended to be a completely air and water tight enclosure, the polywrap shall provide a continuous barrier between the pipe and surrounding bedding and backfill.

2. Materials.

   a. Cast iron piping encasement.

      1) The polywrap shall be minimum 8 mil. in thickness, group 2, linear low density, flat tube, natural (clear) virgin polyethylene film formed into tubes or sheets as required. Material shall meet or exceed the requirements of AWWA C105, ANSI A21.5 and ASTM A674.

      2) The polywrap shall be as manufactured by Northtown Company or approved equal.

b. The minimum Polywrap flat tube width for each pipe diameter shall be as follows:

Pipe Size / Type	Polywrap Flat Tube Width
2” to 3” cast iron	14”
4” cast iron	16”
6” cast iron	20”
8” cast iron	24”
10” cast iron	27”
12” cast iron	30”
15” cast iron	37”

c. The polywrap shall be secured as specified with 2 inch wide pressure sensitive plastic tape not less than 10 mils thick.

1) Tape shall be Scotchwrap No. 50, Polyken No. 900, Tapecoat CT, Johns-Manville No. V-10 Trantex or approved equal.

d. Piping through exterior walls shall be sealed using Link Seal modular seal with nitrile seal elements and stainless steel bolts.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install storm drainage piping at the following minimum slopes unless otherwise indicated:

1. Building Storm Drain: 1% downward in direction of flow for piping NPS 3 and smaller; 1% downward in direction of flow for piping NPS 4 and larger unless noted otherwise on drawings.
2. Horizontal Storm-Drainage Piping: 1% downward in direction of flow unless noted otherwise on drawings.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.

O. Install steel piping according to applicable plumbing code.

P. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

Q. Install engineered siphonic drain specialties and storm drainage piping in locations indicated.

R. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to storm sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

1. Install encasement on piping according to ASTM A 674 or AWWA C105.

S. Install underground, copper, force-main tubing according to CDA's "Copper Tube Handbook."

1. Install encasement on piping according to ASTM A 674 or AWWA C105.

T. Install force mains at elevations indicated.

U. Plumbing Specialties:

1. Install backwater valves in storm drainage gravity-flow piping. Comply with requirements for backwater valves specified in Section 221423 "Storm Drainage Piping Specialties."

2. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts specified in Section 221423 "Storm Drainage Piping Specialties."
3. Install drains in storm drainage gravity-flow piping. Comply with requirements for drains specified in Section 221423 "Storm Drainage Piping Specialties."

V. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

W. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

X. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Y. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

Z. Corrosion Protection:

a. The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the pipe sections. Slip the tube around the pipe, centering it to provide a 1-ft overlap on each adjacent pipe section, and bunching it accordion fashion lengthwise until it clears the pipe ends. Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at each joint to facilitate installation of the polywrap. The bunched-up polywrap shall be pulled from the preceding length of pipe, slipped over the end of the new length of pipe, and secured in place with one circumferential turn of tape plus enough overlap to assure firm adhesion. The end of the polywrap shall be slipped from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe and tape it in place. The loose wrapping on the barrel of the pipe shall be pulled snugly around the barrel of the pipe and excess material folded over the top of the pipe and the folds held in place by means of short strips of adhesive tape, at about 3 foot intervals along the pipe.
b. Rips, punctures or other damage to the tube shall be repaired with the adhesive tape or pieces of tube material secured with tape. Bends and reducers in the line shall be covered with polyethylene in the same manner as pipe.
c. Valves, tees, crosses and outlets shall be wrapped with flat sheets of the same material. The sheets shall be passed under valves and brought up around the body to the stem. Edges shall be brought together, folded twice and secured with the adhesive tape.

3.3 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hub-and-Spigot, Cast-Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Hubless, Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Join copper tube and fittings with soldered joints according to ASTM B 828 procedure. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

F. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fittings. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

G. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

3.4 VALVE INSTALLATION

A. General valve installation requirements are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves: Install shutoff valve on each sump pump discharge.

1. Install gate or full-port ball valve for piping NPS 2 and smaller.
2. Install gate valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing-check valve, between pump and shutoff valve, on each sump pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Install backwater valves in accessible locations.
3. Comply with requirements for backwater valves specified in Section 221423 "Storm Drainage Piping Specialties."

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Individual, Straight, Horizontal Piping Runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
6. Spacing for 10-foot pipe lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
7. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.
8. NPS 10 and NPS 12: 12 feet with 7/8-inch rod.

I. Install supports for vertical steel piping every 15 feet.

J. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 72 inches with 3/8-inch rod.
2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
3. NPS 2-1/2: 108 inches with 1/2-inch rod.

4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
5. NPS 6: 10 feet with 5/8-inch rod.
6. NPS 8: 10 feet with 3/4-inch rod.

K. Install supports for vertical copper tubing every 10 feet.

L. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.

B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.

C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.

1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
2. Install horizontal backwater valves with cleanout cover flush with floor.
3. Comply with requirements for backwater valves cleanouts and drains specified in Section 221423 "Storm Drainage Piping Specialties."

D. Connect force-main piping to the following:

1. Storm Sewer: To exterior force main.
2. Sump Pumps: To sump pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed storm drainage piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.10 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.11 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground storm drainage piping NPS 6 and smaller shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI, heavy-duty, hubless-piping couplings; and coupled joints.

C. Aboveground, storm drainage piping NPS 8 shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI, heavy-duty**,** hubless-piping couplings; and coupled joints.

D. Underground storm drainage piping NPS 6 and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI, heavy-duty, cast-iron**,** hubless-piping couplings; and coupled joints.

E. Underground, storm drainage piping NPS 8 and larger shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI, heavy-duty, cast-iron**,** hubless-piping couplings; and coupled joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

END OF SECTION 22 14 13

SECTION 22 14 23

STROM DRAIN PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof drains.
2. Miscellaneous storm drainage piping specialties.
3. Cleanouts.
4. Flashing materials.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.
2. Storm Drainage, Force-Main Piping: 150 psig.

B. Seismic Performance: Storm drainage piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.

2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

    b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit

detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.12 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.13 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.14 PROJECT CONDITIONS

A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of storm-drainage service.
2. Do not proceed with interruption of storm-drainage service without Architect's written permission.

B. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.

C. Fasteners: Metal compatible with material and substrate being fastened.

D. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

E. Solder: ASTM B 32, lead-free alloy.

PART 2 - PRODUCTS

2.1 METAL ROOF DRAINS

A. Cast-Iron, Large-Sump, General-Purpose Roof Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Zurn
    b. JR Smith
    c. Watts

3. Standard: ASME A112.6.4, for general-purpose roof drains.
4. Body Material: Cast iron.
5. Dimension of Body: Nominal 15-inch diameter.
6. Combination Flashing Ring and Gravel Stop: Required.
7. Outlet: Bottom.
8. Extension Collars: Required.
9. Underdeck Clamp: Required.
10. Sump Receiver Plate: Required.
11. Dome Material: Cast iron.
12. Perforated Gravel Guard: Stainless steel.
13. Vandal-Proof Dome: Required.
14. Overflow Drain Water Dam: 2 inches.

2.2 MISCELLANEOUS STORM DRAINAGE PIPING SPECIALTIES

A. Downspout Adaptors:

1. Description: Manufactured, gray-iron casting, for attaching to horizontal-outlet, parapet roof drain and to exterior, sheet metal downspout.
2. Size: Inlet size to match parapet drain outlet.

B. Downspout Boots:

1. Description: Manufactured, ASTM A 48/A 48M, gray-iron casting, with strap or ears for attaching to building; NPS 4 (DN 100) outlet; and shop-applied bituminous coating.

2. Size: Inlet size to match downspout and NPS 4 (DN 100) outlet.

C. Conductor Nozzles:

1. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.
2. Size: Same as connected conductor.

2.3 CLEANOUTS

A. Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Zurn
    b. JR Smith
    c. Watts.

3. Standard: ASME A112.36.2M, for adjustable housing cleanouts.
4. Size: Same as connected branch.
5. Type: Adjustable housing.
6. Body or Ferrule Material: Cast iron.
7. Clamping Device Required.
8. Outlet Connection: Spigot.
9. Closure: Cast-iron plug.
10. Adjustable Housing Material: Cast iron with threads
11. Frame and Cover Material and Finish: Stainless steel.
12. Frame and Cover Shape: Round.
13. Top-Loading Classification: Heavy Duty.
14. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

B. Test Tees:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Zurn
    b. JR Smith
    c. Watts

3. Standard: ASME A112.36.2M and ASTM A 74, ASTM A 888, or CISPI 301, for cleanout test tees.
4. Size: Same as connected drainage piping.
5. Body Material: Hub-and-spigot, cast-iron soil-pipe T-branch or hubless, cast-iron soil-pipe test tee as required to match connected piping.
6. Closure Plug: Countersunk.
7. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

C. Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Zurn
    b. JR Smith.
    c. Watts

3. Standard: ASME A112.36.2M, for cleanouts. Include wall access.
4. Size: Same as connected drainage piping.
5. Body Material Hubless, cast-iron soil-pipe test tee as required to match connected piping.
6. Closure: Countersunk or raised-head cast-iron plug.
7. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
8. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
9. Wall Access: Round stainless-steel wall-installation frame and cover.

2.4 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. ProSet Systems Inc.

3. Standard: ASTM E 814, for through-penetration firestop assemblies.
4. Certification and Listing**:** Intertek Testing Service NA for through-penetration firestop assemblies.
5. Size: Same as connected pipe.
6. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
7. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
8. Special Coating: Corrosion resistant on interior of fittings.

2.5 FLASHING MATERIALS

A. Copper Sheet: ASTM B 152/B 152M,12 oz./sq. ft.

B. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.

C. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.

D. Fasteners: Metal compatible with material and substrate being fastened.

E. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

F. Solder: ASTM B 32, lead-free alloy.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.

1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
2. Install expansion joints, if indicated, in roof drain outlets.
3. Position roof drains for easy access and maintenance.

B. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:

1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
3. Locate cleanouts at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install test tees in vertical conductors and near floor.

F. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of 6.0-lb/sq. ft. lead sheets, 0.0938-inch thickness or thicker. Solder joints of 4.0-lb/sq. ft. lead sheets, 0.0625-inch thickness or thinner.
2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching the pipe size, with a minimum length of 10 inches and with skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 14 23

SECTION 22 16 16

CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

B. Related Sections:

1. Section 221619 “Condensate Drain Piping Specialties" for sanitary sewerage piping and structures outside the building.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Single-Wall Piping Pressure Rating: 10-foot head of water.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
c. Include all pertinent construction, installation, performance and technical data.
d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section.

In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.12 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.13 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.14 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Architect's written permission.

1.15 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.16 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.17 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Air Conditioning Condensate Drain Piping.

1. Shall be Type "M" copper as specified for water piping.

2.2 COPPER TUBE AND FITTINGS:

A. Hard Copper Tube: ASTM B 88, Type M tube, drawn temper.

B. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

C. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.

3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends

2.3 SPECIALTY PIPE FITTINGS

A. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:

a. Manufacturers: Subject to compliance with requirements, provide products by the following:

1) Wilkins; a Zurn company.

b. Description:

1) Standard: ASSE 1079.
2) Pressure Rating: 150 psig.
3) End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of condensate drain piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install condensate drain piping with 1 percent slope downward toward drain.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping at indicated slopes.

G. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Install unions in copper tubing at connection to each piece of equipment, machine, and specialty.

L. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

M. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

O. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

P. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

B. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

3.3 SPECIALTY PIPE FITTING INSTALLATION

A. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 72 inches with 3/8-inch rod.

2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect drainage and vent piping to the following:

1. Plumbing Specialties: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.

2. Install test tees (wall cleanouts) in conductors near floor.

3. Equipment: Connect drainage piping as indicated. Provide union for each connection.

C. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

D. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

3.6 IDENTIFICATION

A. Identify exposed condensate drain piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

a. Fill condensate drain piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Condensate drain piping will be considered defective if it does not pass tests and inspections

C. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

D. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

3.8 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, condensate drain piping NPS 2 and smaller, shall be the following:

1. Hard copper tube, ASTM B 88, Type M copper, soilder-joint fittings; and soldered joints.

END OF SECTION 22 16 16

SECTION 22 33 00

ELECTRIC DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Commercial, electric, storage, domestic-water heaters.
2. Domestic-water heater accessories.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.4 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
c. Include all pertinent construction, installation, performance and technical data.
d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section.

In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

1.13 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.

C. ASME Compliance:

1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

1.14 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.15 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.16 WARRANTY

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:

1) Storage Tank: Five years.
2) Controls and Other Components: Two years.

b. Compression Tanks: Five years.
c.

PART 2 - PRODUCTS

2.1 COMMERCIAL, ELECTRIC, domestic-WATER HEATERS

A. Commercial, Electric, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AO Smith
b. Bradford White
c. Rheem

2. Standard: UL 1453.

3. Factory-Installed Storage-Tank Appurtenances:

a. Anode Rod: Replaceable magnesium.
b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
c. Insulation: Comply with ASHRAE/IESNA 90.1.

d. Jacket: Steel with enameled finish.
e. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
f. Temperature Control: Adjustable thermostat.
g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
h. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

4. Special Requirements: NSF 5 construction.

2.2 domestic-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. AMTROL Inc.
b. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
c. Taco, Inc.

2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:

a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
c. Air-Charging Valve: Factory installed.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

D. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.

E. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.

F. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

G. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Include dimension that will support bottom of domestic-water heater a minimum of 18 inches above the floor.

H. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base. Comply with requirements for concrete bases specified in Section 033000 "Cast-in-Place Concrete."

1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
2. Maintain manufacturer's recommended clearances.
3. Arrange units so controls and devices that require servicing are accessible.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Install anchor bolts to elevations required for proper attachment to supported equipment.
8. Anchor domestic-water heaters to substrate.

B. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."

C. Install commercial, electric, domestic-water heaters with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

E. Install combination temperature-and-pressure relief valves in water piping for electric, domestic-water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

F. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."

G. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

H. Install thermometers on inlet and outlet piping of residential, solar, electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

I. Assemble and install inlet and outlet piping manifold kits for multiple electric, domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each electric, domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each electric, domestic-water heater outlet. Comply with requirements for valves specified in Section 220523 "General-Duty Valves for Plumbing Piping," and comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

J. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

K. Fill electric, domestic-water heaters with water.

L. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

C. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial, electric, domestic-water heaters.

END OF SECTION 22 33 00

SECTION 22 42 13 13

COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves.
3. Toilet seats.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.
9. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.
10. All single-user toilet facilities shall be identified as a Gender Neutral facilities by a door symbol that complies with CBC Sections 11B-216.8 and 11B-703.2.6.3. no pictogram, text or braille is required on the symbol. If a tactile jamb signage is provided, the signage shall comply with the appropriate technical requirements of CBC Section 11B-703. Examples of appropriate designations are “ALL-GENER RESTROOM”, “RESTROOM’, OR “UNISEX RESTROOM”. DSA BU 17-01.

11. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.
12. Clearance around accessible water closets and in toilet compartments shall be 60 inches minimum measured perpendicular from the side wall and 56 inches minimum measured perpendicular from the rear wall per CBC Section 11B-604.3.1.
13. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
14. Accessible fixture controls shall comply with CBC Sections 11B-604.6 for water closets and 11B-604.9.5 for children's water closets.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.

2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

    b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit

detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than six of each type.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built

information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 FLOOR-MOUNTED, WATER CLOSETS

A. Water Closets: Floor mounted, bottom outlet, top spud.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. American Standard America.
b. Kohler Co.

2. Bowl:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous china.
c. Type: Siphon jet.
d. Style: Flushometer valve.
e. Height: Standard.
f. Rim Contour: Elongated.
g. Water Consumption: 1.28 gal. (4.8 L) per flush.
h. Spud Size and Location: NPS 1-1/2 (DN 40); top.

2.2 FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Sloan Valve Company.

2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig (860 kPa).
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.
9. Consumption: 1.28 gal. (4.8 L) per flush.
10. Minimum Inlet: NPS 1 (DN 25).
11. Minimum Outlet: NPS 1-1/4 (DN 32).

2.3 TOILET SEATS

A. Toilet Seats:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Bemis Manufacturing Company.
b. Olsonite Seat Co.

2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Type: Commercial (Standard).
5. Shape: Elongated rim, open front.
6. Hinge: Self-sustaining, check.
7. Hinge Material: Noncorroding metal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

3.2 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.

C. Install toilet seats on water closets.

D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

3.6 PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.

B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.

C. Fixture controls shall comply with CBC Sections 11B-604.6 for water closets

END OF SECTION 22 42 13 13

SECTION 22 42 13 16

COMMERCIAL URINALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Urinals.
2. Flushometer valves.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.
9. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.
10. All single-user toilet facilities shall be identified as a Gender Neutral facilities by a door symbol that complies with CBC Sections 11B-216.8 and 11B-703.2.6.3. no pictogram, text or braille is required on the symbol. If a tactile jamb signage is provided, the signage shall comply with the appropriate technical requirements of CBC Section 11B-703. Examples of appropriate designations are “ALL-GENER RESTROOM”, “RESTROOM’, OR “UNISEX RESTROOM”. DSA BU 17-01.
11. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.

12. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
13. Accessible fixture controls shall comply with CBC Sections 11B-605.4 for urinals.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
c. Include all pertinent construction, installation, performance and technical data.
d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section.

In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than six of each type.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 WALL-HUNG URINALS

A. Urinals: Wall hung, siphon jet.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. American Standard
   b. Kohler Co.

2. Fixture:

   a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
   b. Material: Vitreous china.
   c. Type: Siphon jet.
   d. Strainer or Trapway: Manufacturer's standard strainer with integral trap.
   e. Water Consumption: Water saving.
   f. Spud Size and Location: NPS 3/4 (DN 20); top.
   g. Outlet Size and Location: NPS 2 (DN 50); back.
   h. Color: White.

3. Waste Fitting:

   a. Standard: ASME A112.18.2/CSA B125.2 for coupling.
   b. Size: NPS 2 (DN 50).

4. Support: ASME A112.6.1M, Type I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture. Include rectangular, steel uprights.

   a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

      1) ZURN CARRIERS

2.2 URINAL FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Sloan Valve Company.

2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig (860 kPa).
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

3.2 INSTALLATION

A. Urinal Installation:

1. Install urinals level and plumb according to roughing-in drawings.
2. Install wall-hung, back-outlet urinals onto waste fitting seals and attached to supports.
3. Install wall-hung, bottom-outlet urinals with tubular waste piping attached to supports.
4. Install accessible, wall-mounted urinals at mounting height for the handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for wall-hung urinals.
2. Use off-floor carriers with waste fitting and seal for back-outlet urinals.
3. Use carriers without waste fitting for urinals with tubular waste piping.
4. Use chair-type carrier supports with rectangular steel uprights for accessible urinals.

C. Flushometer-Valve Installation:

1. Install flushometer-valve water-supply fitting on each supply to each urinal.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible urinals with handle mounted on open side of compartment.
4. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Joint Sealing:

1. Seal joints between urinals and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to urinal color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect urinals with water supplies and soil, waste, and vent piping. Use size fittings required to match urinals.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to urinals, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust urinals and controls. Replace damaged and malfunctioning urinals, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

3.5 CLEANING AND PROTECTION

A. Clean urinals and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed urinals and fittings.

C. Do not allow use of urinals for temporary facilities unless approved in writing by Owner.

3.6 Completion of Installation:

A. Cleaning and Flushing: Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.

B. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.

C. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.

3.7 PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.

B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.

C. Fixture controls shall comply with CBC Sections 11B-605.4 for urinals.

END OF SECTION 22 42 13 16

SECTION 22 42 16 13

COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.
9. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.
10. All single-user toilet facilities shall be identified as a Gender Neutral facilities by a door symbol that complies with CBC Sections 11B-216.8 and 11B-703.2.6.3. no pictogram, text or braille is required on the symbol. If a tactile jamb signage is provided, the signage shall comply with the appropriate technical requirements of CBC Section 11B-703. Examples of appropriate designations are “ALL-GENER RESTROOM”, “RESTROOM’, OR “UNISEX RESTROOM”. DSA BU 17-01.
11. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.

12. Accessible fixture controls shall comply with CBC Sections 11B-606.4 for lavatories and sinks.
13. Accessible lavatories and sinks shall be mounted with the front of the higher of the rim or counter surface 34” maximum above the finish floor or ground. Depth of lavatories or sinks shall not interfere with knee an toe clearance provided in accordance with CBC 11B-306 when forward approach is required CBC Sections 11B-606.3 and 11B606.7.
14. Water supply and drain pipes under accessible lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under accessible lavatories or sinks. CBC Section 11B-606.5.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.

2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

    b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit

detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

A. Lavatory: Vitreous china, wall mounted, with back.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. American Standard America.
b. Kohler Co.

2. Fixture:

a. Standard: ASME A112.19.2/CSA B45.1.
b. Type: For wall hanging.
c. Faucet-Hole Location: Top.
d. Color: White.
e. Mounting Material: Chair carrier.

3. Support: ASME A112.6.1M, Type II, concealed-arm lavatory carrier.

2.2 VITREOUS-CHINA, SELF-RIMMING LAVATORIES

A. Lavatory: Vitreous china, self-rimming.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. American Standard America.
b. Kohler Co.

2. Fixture:

a. Standard: ASME A112.19.2/CSA B45.1.
b. Type: For deck mount.
c. Faucet-Hole Location: Top.
d. Color: White.

2.3 VITREOUS-CHINA, UNDERCOUNTER-MOUNTED LAVATORIES

A. Lavatory: Vitreous china, under-counter mounted.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. American Standard America.
b. Kohler Co.

2. Fixture:

a. Standard: ASME A112.19.2/CSA B45.1.
b. Type: For deck mounted.
c. Faucet-Hole Location: Counter.
d. Color: White.
e. Mounting Material: Manufacturers recommended installation.

2.4 SOLID-BRASS, MANUALLY OPERATED FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Lavatory Faucets: Manual-type, single-control mixing, commercial, solid-brass valve.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Chicago Faucets.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
4. Body Material: Commercial, solid brass.
5. Finish: Polished chrome plate.
6. Mounting Type: Deck, exposed.

2.5 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Chicago

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Chicago

E. Operation: Loose key.

F. Risers:

1. NPS 3/8.
2. Chrome-plated, rigid-copper-pipe and brass straight or offset tailpieces riser.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

G. Point of use mixing valve in cabinet to be recessed in wall, under lavatory.

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow for 10 seconds min per 11B-606.4.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

3.6 PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.

B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.

C. Fixture controls shall comply with CBC Sections 11B-606.4 for lavatories and sinks.

D. Accessible sinks shall be 6-1/2” deep maximum. Sinks shall be mounted with front of the higher of the rim and counter surface 34” maximum above the finish floor or ground.

E. Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks. CBC Section 11B-606.

END OF SECTION 22 42 16 13

SECTION 22 47 13

DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes drinking fountains and related components.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.
9. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.
10. Heights and location of all fixtures shall be mounted according to 11B-307 and 11B-309.
11. Accessible fixture controls shall comply with CBC Sections 11B-602.3 for drinking fountains.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.12 CLOSEOUT SUBMITTALS

A. Maintenance Data: For drinking fountains to include in maintenance manuals.

1.13 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS

A. Drinking Fountains: Stainless steel, wall mounted.

1. Stainless-Steel Drinking Fountains:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    1) Elkay Manufacturing Co.
    2) Haws Corporation.

3. Type Receptor: On horizontal support.
4. Back Panel: Stainless-steel wall plate behind drinking fountain.
5. Bubblers: Two, with adjustable stream regulator, located on deck.
6. Control: Push button.
7. Drain: Grid type with NPS 1-1/4 tailpiece.
8. Supply: NPS 3/8 with shutoff valve.
9. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 chrome-plated brass P-trap and waste.
10. Support: ASME A112.6.1M, Type III lavatory carrier.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.

B. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

C. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

D. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

E. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Install ball, gate, or globe shutoff valve on water supply to each fixture. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."

D. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

3.5 CLEANING

A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

3.6 PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.

B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.

C. Fixture controls shall comply with CBC Sections 11B-602 for drinking fountains.

D. Drinking fountains shall comply with 11B-602.6 water flow. The spout shall provide a flow of water 4 inches (102 mm) high minimum and shall be located 5 inches (127 mm) maximum from the front of the unit. The angle of the water stream shall be measured horizontally relative to the front face of the unit. Where spouts are located less than 3 inches (76 mm) of the front of the unit, the angle of the water stream shall be 30 degrees maximum. Where spouts are located between 3 inches (76 mm) and 5 inches (127 mm) maximum from the front of the unit, the angle of the water shall be 15 degrees maximum.

END OF SECTION 22 47 13

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Equipment supports.

B. Related Sections:

1. Section 230516 "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
2. Section 230548 "Vibration and Seismic Controls for HVAC for vibration isolation devices.
3. Section 233113 "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit.
    b. Cooper B-Line, Inc.
    c. Flex-Strut Inc.
    d. GS Metals Corp.
    e. Thomas & Betts Corporation.
    f. Unistrut Corporation; Tyco International, Ltd.

2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Metallic Coating: Electroplated zinc.

B. Non-MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit.
    b. Cooper B-Line, Inc.
    c. Flex-Strut Inc.
    d. GS Metals Corp.
    e. Thomas & Betts Corporation.
    f. Unistrut Corporation; Tyco International, Ltd.

2. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Coating: Zinc.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.
4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.
6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig minimum compressive strength.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, **zinc-coated** steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece plastic base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Plastic.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled fiberglass struts.

E. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

F. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use

operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

G. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, **NPS 2-1/2** and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

O. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
b. NPS 4: 12 inches long and 0.06 inch thick.
c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal framing systems and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.

8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.

7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

R. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 23 05 48

VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Restrained-spring isolators.
3. Elastomeric hangers.
4. Spring hangers.
5. Snubbers.
6. Restraint channel bracings.
7. Restraint cables.
8. Seismic-restraint accessories.
9. Mechanical anchor bolts.
10. Adhesive anchor bolts.
11. Vibration isolation equipment bases.
12. Restrained isolation roof-curb rails.

1.3 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning & Development (for the State of California).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.

a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.

b. Annotate to indicate application of each product submitted and compliance with requirements.

3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.

B. Qualification Data: For professional engineer and testing agency.

C. Welding certificates.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations.

PART 2 - PRODUCTS

2.1 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Vibration Eliminator Co., Inc.
    g. Vibration Isolation.
    h. Vibration Mountings & Controls, Inc.

2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
3. Size: Factory or field cut to match requirements of supported equipment.
4. Pad Material: Oil and water resistant with elastomeric properties.
5. Surface Pattern: Smooth pattern.
6. Infused nonwoven cotton or synthetic fibers.

2.2 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:

1. Manufacturers: Subject to compliance with requirements, products by one of the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Vibration Eliminator Co., Inc.
    g. Vibration Isolation.
    h. Vibration Mountings & Controls, Inc.

2. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.

    a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
    b. Top plate with threaded mounting holes.
    c. Internal leveling bolt that acts as blocking during installation.

3. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
4. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
5. Minimum Additional Travel: 50 percent of the required deflection at rated load.
6. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
7. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.3 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Vibration Eliminator Co., Inc.
    g. Vibration Mountings & Controls, Inc.

2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
3. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.4 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Kinetics Noise Control, Inc.
    d. Mason Industries, Inc.
    e. Vibration Eliminator Co., Inc.
    f. Vibration Isolation.
    g. Vibration Mountings & Controls, Inc.

2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
8. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
9. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.5 SNUBBERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kinetics Noise Control, Inc.
2. Mason Industries, Inc.
3. Vibration Mountings & Controls, Inc.

B. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
3. Maximum 1/4-inch air gap, and minimum 1/4-inch- thick resilient cushion.

2.6 RESTRAINT CHANNEL BRACINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.
2. Hilti, Inc.
3. Mason Industries, Inc.
4. Unistrut.

B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.7 RESTRAINT CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kinetics Noise Control, Inc.
2. Loos & Co., Inc.
3. Vibration Mountings & Controls, Inc.

B. Restraint Cables: ASTM A 603 galvanized-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.8 SEISMIC-RESTRAINT ACCESSORIES

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:

1. Cooper B-Line, Inc.
2. Kinetics Noise Control, Inc.

3. Mason Industries, Inc.
4. TOLCO.

B. Hanger-Rod Stiffener: Reinforcing steel angle clamped to hanger rod.

C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to restraint cables.

D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.9 MECHANICAL ANCHOR BOLTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.
2. Hilti, Inc.
3. Kinetics Noise Control, Inc.
4. Mason Industries, Inc.

B. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.10 VIBRATION ISOLATION EQUIPMENT BASES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. California Dynamics Corporation.
2. Kinetics Noise Control.
3. Mason Industries, Inc.
4. Vibration Eliminator Co., Inc.
5. Vibration Isolation.
6. Vibration Mountings & Controls, Inc.

B. Steel Rails: Factory-fabricated, welded, structural-steel rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide rails.

a. Include supports for suction and discharge elbows for pumps.

2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Rails shall have shape to accommodate supported equipment.

3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

C. Steel Bases: Factory-fabricated, welded, structural-steel bases and rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.

a. Include supports for suction and discharge elbows for pumps.

2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

D. Concrete Inertia Base: Factory-fabricated, welded, structural-steel bases and rails ready for placement of cast-in-place concrete.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.

a. Include supports for suction and discharge elbows for pumps.

2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
4. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.

2.11 RESTRAINED ISOLATION ROOF-CURB RAILS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:

1. Ace Mountings Co., Inc.
2. California Dynamics Corporation.
3. Kinetics Noise Control.
4. Mason Industries, Inc.
5. Thybar Corporation.

B. Description: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail designed to resiliently support equipment and to withstand seismic and wind forces.

C. Upper Frame: The upper frame shall provide continuous support for equipment and shall be captive to resiliently resist seismic and wind forces.

D. Lower Support Assembly: The lower support assembly shall be formed sheet metal section containing adjustable and removable steel springs that support the upper frame. The lower support assembly shall have a means for attaching to building structure and a wood nailer for attaching roof materials, and shall be insulated with a minimum of 2 inches of rigid, glass-fiber

insulation on inside of assembly. Adjustable, restrained-spring isolators shall be mounted on elastomeric vibration isolation pads and shall have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators shall be located so they are accessible for adjustment at any time during the life of the installation without interfering with the integrity of the roof.

E. Snubber Bushings: All-directional, elastomeric snubber bushings at least 1/4 inch thick.

F. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counterflashed over roof materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic- and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.

B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."

B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

C. Comply with requirements in Section 077200 "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.

D. Equipment Restraints:

1. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
3. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction that provides required submittals for component.

E. Piping Restraints:

1. Comply with requirements in MSS SP-127.
2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
3. Brace a change of direction longer than 12 feet.

F. Install cables so they do not bend across edges of adjacent equipment or building structure.

G. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction that provides required submittals for component.

H. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

I. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

J. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

K. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 232113 "Hydronic Piping" for piping flexible connections.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.
9. Test and adjust restrained-air-spring isolator controls and safeties.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

3.7 VIBRATION ISOLATION EQUIPMENT BASES INSTALLATION

A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."

END OF SECTION 230548

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.
5. Stencils.
6. Valve tags.
7. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

C. Valve numbering scheme.

D. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's unique equipment number.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, manufacturer, model number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 incheshigh.

2.4 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

D. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

E. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

F. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.5 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in other sections.

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Pipe Label Color Schedule:

1. Chilled-Water Piping:

a. Background Color: Blue.
b. Letter Color: White.

2. Condenser-Water Piping:

a. Background Color: Blue.
b. Letter Color: White.

3. Heating Water Piping:

a. Background Color: Yellow.
b. Letter Color: Black.

4. Refrigerant Piping:

a. Background Color: Orange.
b. Letter Color: Black.

3.4 DUCT LABEL INSTALLATION

A. Install plastic-laminated duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.
3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
4. ASME A13.1 Colors and Designs: For hazardous material exhaust.

B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. All Valve-Tags: 1-1/2 inches minimum, round.

2. Valve-Tag Color:

a. All Valve-Tags: Natural.

3. Letter Color:
a. All Valve-Tags: Black.

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 230553

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Constant-volume air systems.
b. Variable-air-volume systems.

2. Balancing Hydronic Piping Systems:

a. Constant-flow hydronic systems.
b. Variable-flow hydronic systems.
c. Primary-secondary hydronic systems.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. TAB: Testing, adjusting, and balancing.

C. TAB Specialist: An entity engaged to perform TAB Work.

1.4 ACTION SUBMITTALS

A. LEED Submittals:

1. Air-Balance Report for Prerequisite IEQ 1: Documentation of work performed for ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
2. TAB Report for Prerequisite EA 2: Documentation of work performed for ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. Certified TAB reports.

E. Sample report forms.

F. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.6 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC.
2. TAB Technician: Employee of the TAB contractor and who is certified by AABC as a TAB technician.

B. TAB Conference: Meet with Construction Manager on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Coordination and cooperation of trades and subcontractors.
d. Coordination of documentation and communication flow.

C. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard TAB contractor's forms approved by Construction Manager.

E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

G. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.7 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.8 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Section 233113

"Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

L. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine system pumps to ensure absence of entrained air in the suction piping.

O. Examine operating safety interlocks and controls on HVAC equipment.

P. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.
3. Automatic temperature-control systems are operational.
4. Equipment and duct access doors are securely closed.
5. Balance, smoke, and fire dampers are open.
6. Isolating and balancing valves are open and control valves are operational.

7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, and SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

    a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.

2. Measure fan static pressures as follows to determine actual static pressure:

    a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
    b. Measure static pressure directly at the fan outlet or through the flexible connection.
    c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
    d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.

    a. Report the cleanliness status of filters and the time static pressures are measured.

4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
6. Obtain approval from Construction Manager for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure airflow of submain and branch ducts.

a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

C. Measure air outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.

B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
3. Measure total system airflow. Adjust to within indicated airflow.
4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.

6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

    a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
8. Record final fan-performance data.

C. Pressure-Dependent, Variable-Air-Volume Systems without Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Balance variable-air-volume systems the same as described for constant-volume air systems.
2. Set terminal units and supply fan at full-airflow condition.
3. Adjust inlet dampers of each terminal unit to indicated airflow and verify operation of the static-pressure controller. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
4. Readjust fan airflow for final maximum readings.
5. Measure operating static pressure at the sensor that controls the supply fan if one is installed, and verify operation of the static-pressure controller.
6. Set supply fan at minimum airflow if minimum airflow is indicated. Measure static pressure to verify that it is being maintained by the controller.
7. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

    a. If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.

8. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

    a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

D. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set system at maximum indicated airflow by setting the required number of terminal units at minimum airflow. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
2. Adjust supply fan to maximum indicated airflow with the variable-airflow controller set at maximum airflow.
3. Set terminal units at full-airflow condition.
4. Adjust terminal units starting at the supply-fan end of the system and continuing progressively to the end of the system. Adjust inlet dampers of each terminal unit to indicated airflow. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Adjust terminal units for minimum airflow.
6. Measure static pressure at the sensor.

7. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

3.7 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.
2. Check liquid level in expansion tank.
3. Check makeup water-station pressure gage for adequate pressure for highest vent.
4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
6. Set system controls so automatic valves are wide open to heat exchangers.
7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.8 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

A. Measure water flow at pumps. Use the following procedures except for positive-displacement pumps:

1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.

    a. If impeller sizes must be adjusted to achieve pump performance, obtain approval from Construction Manager and comply with requirements in Section 232123 "Hydronic Pumps."

2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.

    a. Monitor motor performance during procedures and do not operate motors in overload conditions.

3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
4. Report flow rates that are not within plus or minus 10 percent of design.

B. Measure flow at all automatic flow control valves to verify that valves are functioning as designed.

C. Measure flow at all pressure-independent characterized control valves, with valves in fully open position, to verify that valves are functioning as designed.

D. Set calibrated balancing valves, if installed, at calculated presettings.

E. Measure flow at all stations and adjust, where necessary, to obtain first balance.

1. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.

F. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.

G. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:

1. Determine the balancing station with the highest percentage over indicated flow.
2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
3. Record settings and mark balancing devices.

H. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.

I. Measure the differential-pressure-control-valve settings existing at the conclusion of balancing.

J. Check settings and operation of each safety valve. Record settings.

3.9 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

A. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals and proceed as specified above for hydronic systems.

3.10 PROCEDURES FOR PRIMARY-SECONDARY HYDRONIC SYSTEMS

A. Balance the primary circuit flow first and then balance the secondary circuits.

3.11 PROCEDURES FOR STEAM SYSTEMS

A. Measure and record upstream and downstream pressure of each piece of equipment.

B. Measure and record upstream and downstream steam pressure of pressure-reducing valves.

C. Check settings and operation of automatic temperature-control valves, self-contained control valves, and pressure-reducing valves. Record final settings.

D. Check settings and operation of each safety valve. Record settings.

E. Verify the operation of each steam trap.

3.12 PROCEDURES FOR HEAT EXCHANGERS

A. Measure water flow through all circuits.

B. Adjust water flow to within specified tolerances.

C. Measure inlet and outlet water temperatures.

D. Measure inlet steam pressure.

E. Check settings and operation of safety and relief valves. Record settings.

3.13 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.14 PROCEDURES FOR CHILLERS

A. Balance water flow through each evaporator and condenser to within specified tolerances of indicated flow with all pumps operating. With only one chiller operating in a multiple chiller installation, do not exceed the flow for the maximum tube velocity recommended by the chiller manufacturer. Measure and record the following data with each chiller operating at design conditions:

1. Evaporator-water entering and leaving temperatures, pressure drop, and water flow.
2. For water-cooled chillers, condenser-water entering and leaving temperatures, pressure drop, and water flow.
3. Evaporator and condenser refrigerant temperatures and pressures, using instruments furnished by chiller manufacturer.
4. Power factor if factory-installed instrumentation is furnished for measuring kilowatts.
5. Kilowatt input if factory-installed instrumentation is furnished for measuring kilowatts.
6. Capacity: Calculate in tons of cooling.
7. For air-cooled chillers, verify condenser-fan rotation and record fan and motor data including number of fans and entering- and leaving-air temperatures.

3.15 PROCEDURES FOR COOLING TOWERS

A. Shut off makeup water for the duration of the test, and verify that makeup and blowdown systems are fully operational after tests and before leaving the equipment. Perform the following tests and record the results:

1. Measure condenser-water flow to each cell of the cooling tower.
2. Measure entering- and leaving-water temperatures.
3. Measure wet- and dry-bulb temperatures of entering air.
4. Measure wet- and dry-bulb temperatures of leaving air.
5. Measure condenser-water flow rate recirculating through the cooling tower.
6. Measure cooling-tower spray pump discharge pressure.
7. Adjust water level and feed rate of makeup water system.
8. Measure flow through bypass.

3.16 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record compressor data.

3.17 PROCEDURES FOR BOILERS

A. Hydronic Boilers: Measure and record entering- and leaving-water temperatures and water flow.

B. Steam Boilers: Measure and record entering-water temperature and flow and leaving-steam pressure, temperature, and flow.

3.18 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each water coil:

1. Entering- and leaving-water temperature.
2. Water flow rate.
3. Water pressure drop.
4. Dry-bulb temperature of entering and leaving air.
5. Wet-bulb temperature of entering and leaving air for cooling coils.
6. Airflow.
7. Air pressure drop.

B. Measure, adjust, and record the following data for each electric heating coil:

1. Nameplate data.
2. Airflow.
3. Entering- and leaving-air temperature at full load.
4. Voltage and amperage input of each phase at full load and at each incremental stage.
5. Calculated kilowatt at full load.
6. Fuse or circuit-breaker rating for overload protection.

C. Measure, adjust, and record the following data for each steam coil:

1. Dry-bulb temperature of entering and leaving air.
2. Airflow.
3. Air pressure drop.
4. Inlet steam pressure.

D. Measure, adjust, and record the following data for each refrigerant coil:

1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.
3. Airflow.
4. Air pressure drop.
5. Refrigerant suction pressure and temperature.

3.19 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the refrigerant charge.
4. Check the condition of filters.
5. Check the condition of coils.
6. Check the operation of the drain pan and condensate-drain trap.
7. Check bearings and other lubricated parts for proper lubrication.
8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:

1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the air flow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.20 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.
4. Cooling-Water Flow Rate: Plus or minus 10 percent.

3.21 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.22 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.

c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Unit arrangement and class.
    g. Discharge arrangement.
    h. Sheave make, size in inches, and bore.
    i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
    j. Number, make, and size of belts.
    k. Number, type, and size of filters.

2. Motor Data:

    a. Motor make, and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.
    d. Full-load amperage and service factor.
    e. Sheave make, size in inches, and bore.
    f. Center-to-center dimensions of sheave, and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Filter static-pressure differential in inches wg.
f. Preheat-coil static-pressure differential in inches wg.
g. Cooling-coil static-pressure differential in inches wg.
h. Heating-coil static-pressure differential in inches wg.
i. Outdoor airflow in cfm.
j. Return airflow in cfm.
k. Outdoor-air damper position.
l. Return-air damper position.
m. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch o.c.
f. Make and model number.
g. Face area in sq. ft..
h. Tube size in NPS.
i. Tube and fin materials.
j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Average face velocity in fpm.
c. Air pressure drop in inches wg.
d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
e. Return-air, wet- and dry-bulb temperatures in deg F.
f. Entering-air, wet- and dry-bulb temperatures in deg F.
g. Leaving-air, wet- and dry-bulb temperatures in deg F.
h. Water flow rate in gpm.
i. Water pressure differential in feet of head or psig.
j. Entering-water temperature in deg F.
k. Leaving-water temperature in deg F.
l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure in psig.
n. Refrigerant suction temperature in deg F.
o. Inlet steam pressure in psig.

G. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Make and type.

d. Model number and unit size.
e. Manufacturer's serial number.
f. Fuel type in input data.
g. Output capacity in Btu/h.
h. Ignition type.
i. Burner-control types.
j. Motor horsepower and rpm.
k. Motor volts, phase, and hertz.
l. Motor full-load amperage and service factor.
m. Sheave make, size in inches, and bore.
n. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm.
b. Entering-air temperature in deg F.
c. Leaving-air temperature in deg F.
d. Air temperature differential in deg F.
e. Entering-air static pressure in inches wg.
f. Leaving-air static pressure in inches wg.
g. Air static-pressure differential in inches wg.
h. Low-fire fuel input in Btu/h.
i. High-fire fuel input in Btu/h.
j. Manifold pressure in psig.
k. High-temperature-limit setting in deg F.
l. Operating set point in Btu/h.
m. Motor voltage at each connection.
n. Motor amperage for each phase.
o. Heating value of fuel in Btu/h.

H. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated air flow rate in cfm.
h. Indicated velocity in fpm.
i. Actual air flow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

J. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft..

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Air velocity in fpm.
c. Preliminary air flow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final air flow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

K. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

a. System and air-handling-unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.

e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Entering-water temperature in deg F.
c. Leaving-water temperature in deg F.
d. Water pressure drop in feet of head or psig.
e. Entering-air temperature in deg F.
f. Leaving-air temperature in deg F.

L. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Water flow rate in gpm.
g. Water pressure differential in feet of head or psig.
h. Required net positive suction head in feet of head or psig.
i. Pump rpm.
j. Impeller diameter in inches.
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.
n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):

a. Static head in feet of head or psig.
b. Pump shutoff pressure in feet of head or psig.
c. Actual impeller size in inches.
d. Full-open flow rate in gpm.
e. Full-open pressure in feet of head or psig.
f. Final discharge pressure in feet of head or psig.
g. Final suction pressure in feet of head or psig.
h. Final total pressure in feet of head or psig.
i. Final water flow rate in gpm.
j. Voltage at each connection.
k. Amperage for each phase.

M. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.

e. Dates of calibration.

3.23 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:

   a. Measure airflow of at least 10 percent of air outlets.
   b. Measure water flow of at least 5 percent of terminals.
   c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
   d. Verify that balancing devices are marked with final balance position.
   e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Commissioning Authority.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence Commissioning Authority.
3. Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.24 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 23 07 13

DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
6. Indoor, exposed, Type I, commercial, kitchen hood exhaust.
7. Indoor, concealed oven and warewash exhaust.
8. Indoor, exposed oven and warewash exhaust.
9. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
10. Outdoor, concealed supply and return.
11. Outdoor, exposed supply and return.

B. Related Sections:

1. Section 230716 "HVAC Equipment Insulation."
2. Section 230719 "HVAC Piping Insulation."
3. Section 233113 "Metal Ducts" for duct liners.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
3. Detail application of field-applied jackets.
4. Detail application at linkages of control devices.

D. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Sheet Form Insulation Materials: 12 inches square.
2. Sheet Jacket Materials: 12 inches square.
3. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; SoftTouch Duct Wrap.
b. Johns Manville; Microlite.
c. Knauf Insulation; Friendly Feel Duct Wrap.
d. Owens Corning; SOFTR All-Service Duct Wrap.

G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; Commercial Board.
b. Fibrex Insulations Inc.; FBX.
c. Johns Manville; 800 Series Spin-Glas.
d. Knauf Insulation; Insulation Board.
e. Manson Insulation Inc.; AK Board.
f. Owens Corning; Fiberglas 700 Series.

H. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied [FSK jacket] complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; CrimpWrap.
b. Johns Manville; MicroFlex.
c. Knauf Insulation; Pipe and Tank Insulation.
d. Manson Insulation Inc.; AK Flex.
e. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to 1700 deg F. Comply with ASTM C 656, Type II, Grade 6. Tested and certified to provide a [1] [2]-hour fire rating by an NRTL acceptable to authorities having jurisdiction.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Johns Manville; Super Firetemp M.

B. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a [1] [2]-hour fire rating by an NRTL acceptable to authorities having jurisdiction.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; FlameChek.
b. Johns Manville; Firetemp Wrap.
c. Nelson Fire Stop Products; Nelson FSB Flameshield Blanket.
d. Thermal Ceramics; FireMaster Duct Wrap.
e. 3M; Fire Barrier Wrap Products.
f. Unifrax Corporation; FyreWrap.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.Eagle Bridges - Marathon Industries; 225.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
    b. Eagle Bridges - Marathon Industries; 225.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
    b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
    b. Eagle Bridges - Marathon Industries; 550.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
    d. Mon-Eco Industries, Inc.; 55-50.
    e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
    b. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.Eagle Bridges - Marathon Industries; 405.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    c. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

2.9 TAPES

A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 491 AWF FSK.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
c. Compac Corporation; 110 and 111.
d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.10 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:

a. ITW Insulation Systems; Gerrard Strapping and Seals.
b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015-inch-thick, 1/2 inch wide with wing seal or closed seal.
3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

a. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; CHP-1.
2) GEMCO; Cupped Head Weld Pin.
3) Midwest Fasteners, Inc.; Cupped Head.
4) Nelson Stud Welding; CHP.

2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

a. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; RC-150.
2) GEMCO; R-150.
3) Midwest Fasteners, Inc.; WA-150.
4) Nelson Stud Welding; Speed Clips.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

3. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) GEMCO.
2) Midwest Fasteners, Inc.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. C & F Wire.

2.11 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Section 078413 "Penetration Firestopping"irestopping and fire-resistive joint sealers.

E. Insulation Installation at Floor Penetrations:

1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Impale insulation over pins and attach speed washers.
    f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.

b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and

inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.7 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each duct system defined in the "Duct Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
6. Indoor, exposed, Type I, commercial, kitchen hood exhaust.
7. Indoor, concealed oven and warewash exhaust.
8. Indoor, exposed oven and warewash exhaust.
9. Outdoor, concealed supply and return.
10. Outdoor, exposed supply and return.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.11 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, supply-air duct and plenum insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. Ft. nominal density.
2. Mineral-Fiber Board: 1-1/2 inches thick and 3.0-lb/cu. Ft. nominal density.

B. Concealed, return-air duct and plenum insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. Ft. nominal density.
2. Mineral-Fiber Board: 1-1/2 inches thick and 3.0-lb/cu. Ft. nominal density.

C. Concealed, outdoor-air duct and plenum insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. Ft. nominal density.
2. Mineral-Fiber Board: 1-1/2 inches thick and 3.0-lb/cu. Ft. nominal density.

D. Concealed, Type I, Commercial, Kitchen Hood Exhaust Duct and Plenum Insulation: Fire-rated blanket or board; thickness as required to achieve 2-hour fire rating.

E. Exposed, supply-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

F. Exposed, return-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

G. Exposed, outdoor-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

H. Exposed, Type I, Commercial, Kitchen Hood Exhaust Duct and Plenum Insulation: Fire-rated blanket or board; thickness as required to achieve 2-hour fire rating.

3.12 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.

B. Outdoor, supply-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

C. Outdoor, return-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

D. Outdoor, outdoor-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

END OF SECTION 230713

SECTION 23 07 19

HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following HVAC piping systems:

1. Condensate drain piping, indoors and outdoors.
2. Chilled-water piping, indoors and outdoors.
3. Heating hot-water piping, indoors and outdoors.
4. Refrigerant suction and hot-gas piping, indoors and outdoors.

B. Related Sections:

1. Section 230713 "Duct Insulation."
2. Section 230716 "HVAC Equipment Insulation."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Aeroflex USA, Inc.; Aerocel.
    b. Armacell LLC; AP Armaflex.
    c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

G. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Fibrex Insulations Inc.; Coreplus 1200.
    b. Johns Manville; Micro-Lok.
    c. Knauf Insulation; 1000-Degree Pipe Insulation.
    d. Manson Insulation Inc.; Alley-K.
    e. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

H. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied FSK jacket complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; CrimpWrap.
b. Johns Manville; MicroFlex.
c. Knauf Insulation; Pipe and Tank Insulation.
d. Manson Insulation Inc.; AK Flex.
e. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Ramco Insulation, Inc.; Super-Stik.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA, Inc.; Aeroseal.
b. Armacell LLC; Armaflex 520 Adhesive.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
d. K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
   b. Eagle Bridges - Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
   d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
   b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
   b. Eagle Bridges - Marathon Industries; 550.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
   d. Mon-Eco Industries, Inc.; 55-50.
   e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.

4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
    c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. Metal Jacket:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
   b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
   c. RPR Products, Inc.; Insul-Mate.

2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.

   a. Factory cut and rolled to size.
   b. Finish and thickness are indicated in field-applied jacket schedules.
   c. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
   d. Factory-Fabricated Fitting Covers:

      1) Same material, finish, and thickness as jacket.
      2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
      3) Tee covers.
      4) Flange and union covers.
      5) End caps.
      6) Beveled collars.
      7) Valve covers.

8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 428 AWF ASJ.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
   c. Compac Corporation; 104 and 105.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 491 AWF FSK.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
   c. Compac Corporation; 110 and 111.
   d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.10 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

C. Wire: 0.062-inch soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. C & F Wire.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [2 inches] [4 inches] o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.9 FINISHES

A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.11 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.

2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.12 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 1 inch thick.

B. Chilled Water:

1. Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe, Type I: 1 inch thick.

C. Heating-Hot-Water Supply and Return:

1. Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches thick.

D. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 1 inch thick.

3.13 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Chilled Water:

1. All Pipe Sizes: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 3 inches thick.

B. Heating-Hot-Water Supply and Return:

1. All Pipe Sizes: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.

C. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 2 inches thick.

3.14 OUTDOOR, UNDERGROUND PIPING INSULATION SCHEDULE

A. Loose-fill insulation, for belowground piping, is specified in Section 232113.13 "Underground Hydronic Piping".

3.15 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. None.

3.16 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. Painted Aluminum, Corrugated: 0.024 inch thick.

3.17 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 230719

SECTION 23 08 00

COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.

B. Related Sections:

1. Section 019113 "General Commissioning Requirements" for general commissioning process requirements.

1.3 DEFINITIONS

A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

B. CxA: Commissioning Authority.

C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.

D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates of readiness.

B. Certificates of completion of installation, prestart, and startup activities.

1.5 ALLOWANCES

A. Labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing are covered by the "Schedule of Allowances" Article in Section 012100 "Allowances."

1.6 UNIT PRICES

A. Commissioning testing allowance may be adjusted up or down by the "List of Unit Prices" Article in Section 012200 "Unit Prices" when actual man-hours are computed at the end of commissioning testing.

1.7 CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning tests at the direction of the CxA.

B. Attend construction phase controls coordination meeting.

C. Attend testing, adjusting, and balancing review and coordination meeting.

D. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.8 CxA'S RESPONSIBILITIES

A. Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.

B. Direct commissioning testing.

C. Verify testing, adjusting, and balancing of Work are complete.

D. Provide test data, inspection reports, and certificates in Systems Manual.

1.9 COMMISSIONING DOCUMENTATION

A. Provide the following information to the CxA for inclusion in the commissioning plan:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
6. Test and inspection reports and certificates.
7. Corrective action documents.

8. Verification of testing, adjusting, and balancing reports.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

A. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.2 Testing AND BALANCING VERIFICATION

A. Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least 10 days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.

C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.

1. The CxA will notify testing and balancing Contractor 10 days in advance of the date of field verification. Notice will not include data points to be verified.
2. The testing and balancing Contractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.

4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA along with the HVAC&R Contractor, testing and balancing Contractor, and HVAC&R Instrumentation and Control Contractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.4 hvac&R systems, subsystems, and equipment Testing Procedures

A. Boiler Testing and Acceptance Procedures: Testing requirements are specified in HVAC boiler Sections. Provide submittals, test data, inspector record, and boiler certification to the CxA.

B. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Section 230900 "Instrumentation and Control for HVAC" and Section 230993 "Sequence and Operations for HVAC Controls." Assist the CxA with preparation of testing plans.

C. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment requirements are specified in HVAC piping Sections. HVAC&R Contractor shall prepare a pipe system cleaning,

flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

D. Energy Supply System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of gas, steam, hot-water, and/or solar systems and equipment at the direction of the CxA. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

E. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

F. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

G. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

END OF SECTION 230800

SECTION 23 09 00

INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

B. Related Sections include the following:

1. Section 230519 "Meters and Gages for HVAC Piping" for measuring equipment that relates to this Section.
2. Section 230993 "Sequence of Operations for HVAC Controls" for requirements that relate to this Section.

1.3 DEFINITIONS

A. DDC: Direct digital control.

B. I/O: Input/output.

C. MS/TP: Master slave/token passing.

D. PC: Personal computer.

E. PID: Proportional plus integral plus derivative.

F. RTD: Resistance temperature detector.

1.4 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:

1. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.
2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.
3. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.

4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
5. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.
6. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.
7. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
8. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:

    a. Water Temperature: Plus or minus 1 deg F.
    b. Water Flow: Plus or minus 5 percent of full scale.
    c. Water Pressure: Plus or minus 2 percent of full scale.
    d. Space Temperature: Plus or minus 1 deg F.
    e. Ducted Air Temperature: Plus or minus 1 deg F.
    f. Outside Air Temperature: Plus or minus 2 deg F.
    g. Dew Point Temperature: Plus or minus 3 deg F.
    h. Temperature Differential: Plus or minus 0.25 deg F.
    i. Relative Humidity: Plus or minus 5 percent.
    j. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
    k. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
    l. Airflow (Terminal): Plus or minus 10 percent of full scale.
    m. Air Pressure (Space): Plus or minus 0.01-inch wg.
    n. Air Pressure (Ducts): Plus or minus 0.1-inch wg.
    o. Carbon Monoxide: Plus or minus 5 percent of reading.
    p. Carbon Dioxide: Plus or minus 50 ppm.
    q. Electrical: Plus or minus 5 percent of reading.

1.5 ACTION SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.
3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
3. Wiring Diagrams: Power, signal, and control wiring.
4. Details of control panel faces, including controls, instruments, and labeling.

5. Written description of sequence of operation.
6. Schedule of dampers including size, leakage, and flow characteristics.
7. Schedule of valves including flow characteristics.
8. DDC System Hardware:

    a. Wiring diagrams for control units with termination numbers.
    b. Schematic diagrams and floor plans for field sensors and control hardware.
    c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.

9. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
10. Controlled Systems:

    a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
    b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
    c. Written description of sequence of operation including schematic diagram.
    d. Points list.

1.6 INFORMATIONAL SUBMITTALS

A. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.

B. Qualification Data: For Installer and manufacturer.

C. Software Upgrade Kit: For Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.

D. Field quality-control test reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.

B. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.

2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.
5. Software license required by and installed for DDC workstations and control systems.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with ASHRAE 135 for DDC system components.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

B. System Software: Update to latest version of software at Project completion.

1.10 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

B. Coordinate equipment with Section 281600 "Intrusion Detection" to achieve compatibility with equipment that interfaces with that system and with building master clock.

C. Coordinate equipment with Section 281300 "Access Control" to achieve compatibility with equipment that interfaces with that system.

D. Coordinate equipment with Section 275313 "Clock Systems" to achieve compatibility with equipment that interfaces with that system.

E. Coordinate equipment with Section 284619 "PLC Electronic Detention Monitoring and Control Systems" to achieve compatibility with equipment that interfaces with that system.

F. Coordinate equipment with Section 260943.13 "Addressable-Fixture Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls" to achieve compatibility with equipment that interfaces with that system.

G. Coordinate equipment with Section 283111 "Digital, Addressable Fire-Alarm System" and Section 283112 "Zoned (DC Loop) Fire-Alarm System" to achieve compatibility with equipment that interfaces with that system.

H. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.

I. Coordinate equipment with Section 260913 "Electrical Power Monitoring and Control" to achieve compatibility of communication interfaces.

J. Coordinate equipment with Section 262416 "Panelboards" to achieve compatibility with starter coils and annunciation devices.

K. Coordinate equipment with Section 262419 "Motor-Control Centers" to achieve compatibility with motor starters and annunciation devices.

L. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturer specified.

2.2 CONTROL SYSTEM

A. Manufacturers:

   1. Carrier i-Vu.
   2. Alerton Inc.
   3. Automated Logic Corporation

B. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.

C. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

D. Control system shall include the following:

   1. Building intrusion detection system specified in Section 281600 "Intrusion Detection."
   2. Building clock control system specified in Section 275313 "Clock Systems."
   3. Building lighting control system specified in Section 260943.13 "Addressable-Fixture Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls."
   4. Fire alarm system specified in Section 283111 "Digital, Addressable Fire-Alarm System" and Section 283112 "Zoned (DC Loop) Fire-Alarm System."

2.3 DDC EQUIPMENT

A. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.

1. Units monitor or control each I/O point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator workstation or diagnostic terminal unit.
2. Stand-alone mode control functions operate regardless of network status. Functions include the following:

a. Global communications.
b. Discrete/digital, analog, and pulse I/O.
c. Monitoring, controlling, or addressing data points.
d. Software applications, scheduling, and alarm processing.
e. Testing and developing control algorithms without disrupting field hardware and controlled environment.

3. Standard Application Programs:

a. Electric Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization, night setback/setup, on-off control with differential sequencing, staggered start, antishort cycling, PID control, DDC with fine tuning, and trend logging.
b. HVAC Control Programs: Optimal run time, supply-air reset, and enthalpy switchover.
c. Chiller Control Programs: Control function of condenser-water reset, chilled-water reset, and equipment sequencing.
d. Programming Application Features: Include trend point; alarm processing and messaging; weekly, monthly, and annual scheduling; energy calculations; run-time totalization; and security access.
e. Remote communications.
f. Maintenance management.
g. Units of Measure: Inch-pound and SI (metric).

4. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
5. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

B. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.

1. Units monitor or control each I/O point, process information, and download from or upload to operator workstation or diagnostic terminal unit.
2. Stand-alone mode control functions operate regardless of network status. Functions include the following:

a. Global communications.
b. Discrete/digital, analog, and pulse I/O.
c. Monitoring, controlling, or addressing data points.

3. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.

4. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

C. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.

1. Binary Inputs: Allow monitoring of on-off signals without external power.
2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation.
5. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA).
6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
7. Universal I/Os: Provide software selectable binary or analog outputs.

D. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:

1. Output ripple of 5.0 mV maximum peak to peak.
2. Combined 1 percent line and load regulation with 100-mic.sec. response time for 50 percent load changes.
3. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.

E. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:

1. Minimum dielectric strength of 1000 V.
2. Maximum response time of 10 nanoseconds.
3. Minimum transverse-mode noise attenuation of 65 dB.
4. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.

2.4 UNITARY CONTROLLERS

A. Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.

1. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and 72-hour battery backup.
2. Operating System: Manage I/O communication to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms. Perform scheduling with real-time clock. Perform automatic system diagnostics; monitor system and report failures.
3. ASHRAE 135 Compliance: Communicate using read (execute and initiate) and write (execute and initiate) property services defined in ASHRAE 135. Reside on network using MS/TP datalink/physical layer protocol and have service communication port for connection to diagnostic terminal unit.
4. Enclosure: Dustproof rated for operation at 32 to 120 deg F.

5. Enclosure: Waterproof rated for operation at 40 to 150 deg F.

2.5 ALARM PANELS

A. Unitized cabinet with suitable brackets for wall or floor mounting. Fabricate of 0.06-inch- thick, furniture-quality steel or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish. Provide common keying for all panels.

B. Indicating light for each alarm point, single horn, acknowledge switch, and test switch, mounted on hinged cover.

1. Alarm Condition: Indicating light flashes and horn sounds.
2. Acknowledge Switch: Horn is silent and indicating light is steady.
3. Second Alarm: Horn sounds and indicating light is steady.
4. Alarm Condition Cleared: System is reset and indicating light is extinguished.
5. Contacts in alarm panel allow remote monitoring by independent alarm company.

2.6 ANALOG CONTROLLERS

A. Step Controllers: 6- or 10-stage type, with heavy-duty switching rated to handle loads and operated by electric motor.

B. Electric, Outdoor-Reset Controllers: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range, adjustable set point, scale range minus 10 to plus 70 deg F, and single- or double-pole contacts.

C. Electronic Controllers: Wheatstone-bridge-amplifier type, in steel enclosure with provision for remote-resistance readjustment. Identify adjustments on controllers, including proportional band and authority.

1. Single controllers can be integral with control motor if provided with accessible control readjustment potentiometer.

D. Fan-Speed Controllers: Solid-state model providing field-adjustable proportional control of motor speed from maximum to minimum of 55 percent and on-off action below minimum fan speed. Controller shall briefly apply full voltage, when motor is started, to rapidly bring motor up to minimum speed. Equip with filtered circuit to eliminate radio interference.

E. Receiver Controllers: Single- or multiple-input models with control-point adjustment, direct or reverse acting with mechanical set-point adjustment with locking device, proportional band adjustment, authority adjustment, and proportional control mode.

1. Remote-control-point adjustment shall be plus or minus 20 percent of sensor span, input signal of 3 to 13 psig.
2. Proportional band shall extend from 2 to 20 percent for 5 psig.
3. Authority shall be 20 to 200 percent.
4. Air-supply pressure of 18 psig, input signal of 3 to 15 psig, and output signal of zero to supply pressure.
5. Gages: 1-1/2 inches in diameter, 2.5 percent wide-scale accuracy, and range to match transmitter input or output pressure.

2.7 TIME CLOCKS

A. Manufacturers:

1. ATC-Diversified Electronics.
2. Grasslin Controls Corporation.
3. Paragon Electric Co., Inc.
4. Precision Multiple Controls, Inc.
5. SSAC Inc.; ABB USA.
6. TCS/Basys Controls.
7. Theben AG - Lumilite Control Technology, Inc.
8. Time Mark Corporation.

B. Seven-day, programming-switch timer with synchronous-timing motor and seven-day dial; continuously charged, nickel-cadmium-battery-driven, eight-hour, power-failure carryover; multiple-switch trippers; minimum of two and maximum of eight signals per day with two normally open and two normally closed output contacts.

C. Solid-state, programmable time control with 8 separate programs each with up to 100 on-off operations; 1-second resolution; lithium battery backup; keyboard interface and manual override; individual on-off-auto switches for each program; 365-day calendar with 20 programmable holidays; choice of fail-safe operation for each program; system fault alarm; and communications package allowing networking of time controls and programming from PC.

2.8 ELECTRONIC SENSORS

A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.

B. Thermistor Temperature Sensors and Transmitters:

1. Manufacturers:

   a. BEC Controls Corporation.
   b. Ebtron, Inc.
   c. Heat-Timer Corporation.
   d. I.T.M. Instruments Inc.
   e. MAMAC Systems, Inc.
   f. RDF Corporation.

2. Accuracy: Plus or minus 0.5 deg F at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, 8 inches long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft..
5. Averaging Elements in Ducts: 18 inches long, rigid; use where prone to temperature stratification or where ducts are larger than 10 sq. ft..
6. Insertion Elements for Liquids: Brass or stainless-steel socket with minimum insertion length of 2-1/2 inches.
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.
8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.

C. RTDs and Transmitters:

1. Manufacturers:

    a. BEC Controls Corporation.
    b. MAMAC Systems, Inc.
    c. RDF Corporation.

2. Accuracy: Plus or minus 0.2 percent at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, 8 inches long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft..
5. Averaging Elements in Ducts: 18 inches long, rigid; use where prone to temperature stratification or where ducts are larger than 9 sq. ft.; length as required.
6. Insertion Elements for Liquids: Brass socket with minimum insertion length of 2-1/2 inches.
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.
8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.

D. Humidity Sensors: Bulk polymer sensor element.

1. Manufacturers:

    a. BEC Controls Corporation.
    b. General Eastern Instruments.
    c. MAMAC Systems, Inc.
    d. ROTRONIC Instrument Corp.
    e. TCS/Basys Controls.
    f. Vaisala.

2. Accuracy: 2 percent full range with linear output.
3. Room Sensor Range: 20 to 80 percent relative humidity.
4. Room Sensor Cover Construction: Manufacturer's standard locking covers.
5. Duct Sensor: 20 to 80 percent relative humidity range with element guard and mounting plate.
6. Outside-Air Sensor: 20 to 80 percent relative humidity range with mounting enclosure, suitable for operation at outdoor temperatures of minus 22 to plus 185 deg F.
7. Duct and Sensors: With element guard and mounting plate, range of 0 to 100 percent relative humidity.

E. Pressure Transmitters/Transducers:

1. Manufacturers:

    a. BEC Controls Corporation.
    b. General Eastern Instruments.
    c. MAMAC Systems, Inc.
    d. ROTRONIC Instrument Corp.
    e. TCS/Basys Controls.
    f. Vaisala.

2. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.

    a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.

b. Output: 4 to 20 mA.
c. Building Static-Pressure Range: 0- to 0.25-inch wg.
d. Duct Static-Pressure Range: 0- to 5-inch wg.

3. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure; linear output 4 to 20 mA.
4. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure and tested to 300-psig; linear output 4 to 20 mA.
5. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.
6. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; linear output 4 to 20 mA.

F. Room Sensor Cover Construction: Manufacturer's standard locking covers.
G. Room sensor accessories include the following:

1. Insulating Bases: For sensors located on exterior walls.
2. Guards: Locking; heavy-duty, transparent plastic; mounted on separate base where indicated in plans.

2.9 STATUS SENSORS

A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg.

B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig, piped across pump.

C. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.

D. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.

E. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor.

F. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.

G. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.

H. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

1. Manufacturers:

a. BEC Controls Corporation.
b. I.T.M. Instruments Inc.

2.10 GAS DETECTION EQUIPMENT

A. Manufacturers:

1. Honeywell International Inc.; Home & Building Control.
2. Sensidyne, Inc.
3. TSI Incorporated.
4. Vulcain Inc.

B. Carbon Monoxide Detectors: Single or multichannel, dual-level detectors using solid-state plug-in sensors with a 3-year minimum life; suitable over a temperature range of 32 to 104 deg F; with 2 factory-calibrated alarm levels at 35 and 200 ppm.

C. Carbon Dioxide Sensor and Transmitter: Single detectors using solid-state infrared sensors; suitable over a temperature range of 23 to 130 deg F and calibrated for 0 to 2 percent, with continuous or averaged reading, 4- to 20-mA output;, for wall mounting.

D. Occupancy Sensor: Passive infrared, with time delay, daylight sensor lockout, sensitivity control, and 180-degree field of view with vertical sensing adjustment; for flush mounting.

2.11 FLOW MEASURING STATIONS

A. Thermal Airflow Station, Air Ducted/Plenum:

1. Manufacturers:

a. Ebtron, Inc.
b. Greenheck
c. Ruskin

2. Description:

a. Thermal airflow station with one or more sensor nodes mounted in a probe, and a remotely mounted microprocessor-based transmitter at each measurement location.
b. Sensor nodes with one self-heated and one zero power bead-in-glass thermistor at each sensing node, using the principle of thermal dispersion.

3. Airflow Station Performance:

a. Independent processing of up to 16 separately wired sensor node assemblies.
b. Airflow rate and temperature of each sensor is equally weighted and averaged by the transmitter prior to output.
c. Accuracy: Within 3 percent of reading for ducted applications, within 5 percent of reading for non-ducted applications, when installed in accordance with the manufacturer's recommended placement guidelines. Include the combined uncertainty of the sensor nodes and transmitter. For devices whose overall accuracy is based on individual accuracy specifications of the sensor probes and transmitter, demonstrate compliance with the accuracy requirement over the entire operating range.

4. Sensor Node and Probe Assemblies:

a. Sensor Node Construction: Two bead-in-glass, hermetically sealed thermistors potted in a marine grade waterproof epoxy with sensor housings constructed of glass-filled polypropylene. Construct with only the thermistor located within the sensing node and all other electronic components outside the airstream. Epoxy or glass encapsulated chip thermistors or devices with exposed leads are not allowed.
b. Performance rated and tested with a 100 percent survival rate in a 30-day saltwater and acid vapor test with written independent laboratory test results.
c. Store sensor node airflow and temperature calibration data in a serial memory chip, in the cable connecting plug. Stored data does not require matching or adjustments to the transmitter in the field.
d. Sensor Node Calibration: Individually calibrated at 16 measurement points to airflow standards directly calibrated at NIST to the NIST Laser Doppler Anemometer (LDA) primary velocity standard.

    1) Accuracy: Within 2 percent of reading over the entire calibrated airflow range of 0 to 5,000 fpm .
    2) Individually calibrate thermistor at a minimum of 3 temperatures to NIST-traceable temperature standards.

e. Sensing Node Temperature Accuracy: Within 0.15 deg F over an operating range of minus 20 deg F to plus 160 deg F and humidity range of 0 to 100 percent RH.
f. Provide the number of independent sensor nodes as follows:

    1) For Duct/Plenum Area up to 0.5 sq. ft. : 1.
    2) For Duct/Plenum Area Greater than 0.5 through 1.0 sq. ft. : 2.
    3) For Duct/Plenum Area Greater than 1.0 through 2.0 sq. ft. : 4.
    4) For Duct/Plenum Area Greater than 2.0 through 4.0 sq. ft. : 6.
    5) For Duct/Plenum Area Greater than 4.0 through 8.0 sq. ft. : 8.
    6) For Duct/Plenum Area Greater than 8.0 through 12.0 sq. ft. : 12.
    7) For Duct/Plenum Area Greater than 12.0 through 14.0 sq. ft. : 14.
    8) For Duct/Plenum Area Greater than 14.0 sq. ft. : 16.

g. For an aspect ratio of 1.5 or less, and an area of 25 sq. ft. or greater, 4 probes are required.
h. Sensor Probe Construction: Gold anodized, 6063 aluminum alloy tube, with each sensor probe containing one or more independently wired sensing nodes.
i. Sensor Probe Mounting Bracket Construction: Type 304 stainless steel.
j. Internal Probe Wiring: Kynar coated copper between the connecting cable and sensor nodes.
k. Internal Probe Wiring Connections: Solder joints and spot welds, sealed and protected from the elements, so that direct exposure to water will not affect instrument operation.
l. Sensor Probe Jacket: Integral, FEP jacket, plenum rated CMP/CL2P, UL/cUL-Listed cable, rated for exposures from minus 67 deg F to plus 392 deg F , and for continuous and direct UV exposure.
m. Sensor Probe Cable Connector Plug: Gold plated pins for connection to the transmitter.

5. Transmitter:

    a. Transmitter determines the average airflow rate and temperature of connected sensor nodes in an array for a single location.
    b. User Interface: 16-character, alpha-numeric, LCD display, with two field selectable analog output signals and network output capability.

1) Two field selectable 0-5/0-10 V dc, or 4-20 mA, scalable, isolated, over-current protected analog output signals. The first output (AO1) provides the total airflow rate. The second output (AO2) is field configurable for temperature or low and/or high airflow set point (user defined) or system status alarm. The RS-485 (BACnet MS/TP, or Modbus RTU) network connection provides the average airflow rate, temperature, high and/or low airflow set point alarm, system status alarm, individual sensor node airflow rates and individual sensor node temperatures.

c. Printed Circuit Board Interconnects: Gold plated edge fingers, receptacle plug pins, and printed circuit board test points.
d. Printed Circuit Boards: Electroless nickel immersion gold (ENIG) plated.
e. Integrated Circuitry: Temperature rated, industrial-grade.
f. Integration Buffers: Separate integration buffers for display of airflow output, airflow signal output (analog and network), and individual sensor output (IR-interface).
g. Transmitter Features and Functions:

1) High and/or low airflow alarm with user-defined set point and percent of set point tolerance.
2) Manual or automatic alarm reset, and low-limit cutoff value may be selected to disable the alarm.
3) Alarm delay function, field defined.
4) Sensor node malfunction via the system status alarm and ignore the sensor node that is in a fault condition.
5) Field configuration, diagnostics, and Field Output Adjustment Wizard that allows for a one- or two-point field adjustment to factory calibration for installations that require adjustment.
6) Automatic reset after power disruption, transients, and brown-outs through a watchdog timer circuit.
7) Operating temperature range of minus 20 deg F to plus 120 deg F and humidity range of 5 to 95 percent RH.
8) Electrical Power Requirement: 24-V ac (between 22.8- and 26.4-V ac under load) at 20-VA maximum, using a switching power supply that is over-current and over-voltage protected.

6. Listing and Certifications:

a. UL/cUL Listing: UL/cUL 873 Listed as an assembly.
b. BTL Listing: BTL Listed, network-capable, airflow stations supplied with RS-485 interface and BACnet protocol.

2.12 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.

1. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.

3. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
4. Spring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running and breakaway torque of 150 in. x lbf.
5. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
6. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running and breakaway torque of 150 in. x lbf.

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.

1. Manufacturers:

   a. Belimo Aircontrols (USA), Inc.

2. Valves: Size for torque required for valve close off at maximum pump differential pressure.
3. Dampers: Size for running torque calculated as follows:

   a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. of damper.
   b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
   c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ft of damper.
   d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. of damper.
   e. Dampers with 2- to 3-Inch wg of Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque by 1.5.
   f. Dampers with 3- to 4-Inch wg of Pressure Drop or Face Velocities of 2500 to 3000 fpm: Increase running torque by 2.0.

4. Coupling: V-bolt and V-shaped, toothed cradle.
5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
6. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
7. Power Requirements (Two-Position Spring Return): 24-V ac.
8. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
9. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
10. Temperature Rating: Minus 22 to plus 122 deg F.
11. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F.
12. Run Time: 30 seconds.

2.13 CONTROL VALVES

A. Manufacturers:

1. Danfoss Inc.; Air Conditioning & Refrigeration Div.
2. Erie Controls.
3. Hayward Industrial Products, Inc.
4. Magnatrol Valve Corporation.
5. Neles-Jamesbury.
6. Parker Hannifin Corporation; Skinner Valve Division.
7. Pneuline Controls.
8. Sauter Controls Corporation.

B. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.

C. Hydronic system globe valves shall have the following characteristics:

1. NPS 2 and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.
2. NPS 2-1/2 and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
3. Internal Construction: Replaceable plugs and stainless-steel or brass seats.

    a. Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom.
    b. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.

4. Sizing: 5-psig maximum pressure drop at design flow rate or the following:

    a. Two Position: Line size.
    b. Two-Way Modulating: Either the value specified above or twice the load pressure drop, whichever is more.
    c. Three-Way Modulating: Twice the load pressure drop, but not more than value specified above.

5. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
6. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.

D. Butterfly Valves: 200-psig, 150-psig maximum pressure differential, ASTM A 126 cast-iron or ASTM A 536 ductile-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals.

1. Body Style: Lug.
2. Disc Type: Epoxy-coated ductile iron.
3. Sizing: 1-psig maximum pressure drop at design flow rate.

E. Terminal Unit Control Valves: Bronze body, bronze trim, two or three ports as indicated, replaceable plugs and seats, and union and threaded ends.

1. Rating: Class 125 for service at 125 psig and 250 deg F operating conditions.
2. Sizing: 3-psig maximum pressure drop at design flow rate, to close against pump shutoff head.
3. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.

2.14 DAMPERS

A. Manufacturers:

1. Air Balance Inc.

2. Don Park Inc.; Autodamp Div.
3. TAMCO (T. A. Morrison & Co. Inc.).
4. United Enertech Corp.
5. Vent Products Company, Inc.

B. Dampers: AMCA-rated, parallel-blade design; 0.108-inch- minimum thick, galvanized-steel or 0.125-inch- minimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than 0.064-inch- thick galvanized steel with maximum blade width of 8 inches and length of 48 inches.

1. Secure blades to 1/2-inch- diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F.
3. Edge Seals, Standard Pressure Applications: Closed-cell neoprene.
4. Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less than 10 cfm per sq. ft. of damper area, at differential pressure of 4-inch wg when damper is held by torque of 50 in. x lbf; when tested according to AMCA 500D.

2.15 CONTROL CABLE

A. Electronic and fiber-optic cables for control wiring are specified in Section 271500 "Communications Horizontal Cabling."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that power supply is available to control units and operator workstation.

B. Verify duct-, pipe-, and equipment-mounted devices are installed before proceeding with installation.

3.2 INSTALLATION

A. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.

B. Connect and configure equipment and software to achieve sequence of operation specified.

C. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation.

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

D. Install guards on thermostats in the following locations:

1. Entrances.
2. Public areas.

3. Where indicated.

E. Install automatic dampers according to Section 233300 "Air Duct Accessories."

F. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.

G. Install labels and nameplates to identify control components according to Section 230553 "Identification for HVAC Piping and Equipment."

H. Install hydronic instrument wells, valves, and other accessories according to Section 232116 Hydronic Piping Specialties."

I. Install steam and condensate instrument wells, valves, and other accessories according toSection 232216 Steam and Condensate Piping Specialties."

J. Install refrigerant instrument wells, valves, and other accessories according to Section 232300 "Refrigerant Piping."

K. Install duct volume-control dampers according to Section 233113 "Metal Ducts" and Section 233116 "Nonmetal Ducts."

L. Install electronic and fiber-optic cables according to Section 271500 "Communications Horizontal Cabling."

3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install raceways, boxes, and cabinets according to Section 260533 "Raceways and Boxes for Electrical Systems."

B. Install building wire and cable according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Install signal and communication cable according to Section 271500 "Communications Horizontal Cabling."

1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
2. Install exposed cable in raceway.
3. Install concealed cable in raceway.
4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
7. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.

D. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

E. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
2. Test and adjust controls and safeties.
3. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
4. Pressure test control air piping at 30 psig or 1.5 times the operating pressure for 24 hours, with maximum 5-psig loss.
5. Pressure test high-pressure control air piping at 150 psig and low-pressure control air piping at 30 psig for 2 hours, with maximum 1-psig loss.
6. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
7. Test each point through its full operating range to verify that safety and operating control set points are as required.
8. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
9. Test each system for compliance with sequence of operation.
10. Test software and hardware interlocks.

C. DDC Verification:

1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
2. Check instruments for proper location and accessibility.
3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
4. Check instrument tubing for proper fittings, slope, material, and support.
5. Check installation of air supply for each instrument.
6. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
7. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
8. Check temperature instruments and material and length of sensing elements.
9. Check control valves. Verify that they are in correct direction.
10. Check air-operated dampers. Verify that pressure gages are provided and that proper blade alignment, either parallel or opposed, has been provided.
11. Check DDC system as follows:

    a. Verify that DDC controller power supply is from emergency power supply, if applicable.
    b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
    c. Verify that spare I/O capacity has been provided.
    d. Verify that DDC controllers are protected from power supply surges.

D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.5 ADJUSTING

A. Calibrating and Adjusting:

1. Calibrate instruments.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs:

    a. Check analog inputs at 0, 50, and 100 percent of span.
    b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
    c. Check digital inputs using jumper wire.
    d. Check digital outputs using ohmmeter to test for contact making or breaking.
    e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.

5. Flow:

    a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
    b. Manually operate flow switches to verify that they make or break contact.

6. Pressure:

    a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
    b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.

7. Temperature:

    a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
    b. Calibrate temperature switches to make or break contacts.

8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
10. Provide diagnostic and test instruments for calibration and adjustment of system.
11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial temperature and humidity set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. Refer to Section 017900 "Demonstration and Training."

END OF SECTION 230900

SECTION 23 23 00

REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig.
2. Hot-Gas and Liquid Lines: 535 psig.

1.4 ACTION SUBMITTALS

A. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.

1. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.7 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 88, Type L.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Brazing Filler Metals: AWS A5.8.

2.2 REFRIGERANTS

A. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Suction Lines for Conventional Air-Conditioning Applications: Copper, Type L, drawn-temper tubing and wrought-copper fittings with brazed joints.

B. Hot-Gas and Liquid Lines: Copper, Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

J. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

K. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

L. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Liquid lines may be installed level.

M. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

N. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

O. Identify refrigerant piping and valves according to Section 230553 "Identification for HVAC Piping and Equipment."

P. Install sleeves for piping penetrations of walls, ceilings, and floors.

Q. Install sleeve seals for piping penetrations of concrete walls and slabs.

R. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

3.4 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
7. NPS 2-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
8. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
9. NPS 4: Maximum span, 12 feet; minimum rod size, 1/2 inch.

D. Support multifloor vertical runs at least at each floor.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.

a. Fill system with nitrogen to the required test pressure.

b. System shall maintain test pressure at the manifold gage throughout duration of test.
c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.6 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

3.7 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Verify that compressor oil level is correct.
2. Open compressor suction and discharge valves.
3. Open refrigerant valves except bypass valves that are used for other purposes.
4. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 23 31 13

METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.
7. Seismic-restraint devices.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.

B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Perimeter moldings.

B. Welding certificates.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Lindab Inc.
    b. McGill AirFlow LLC.
    c. SEMCO Incorporated.
    d. Sheet Metal Connectors, Inc.
    e. Spiral Manufacturing Co., Inc.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.

D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation; Insulation Group.
b. Johns Manville.
c. Knauf Insulation.
d. Owens Corning.

2. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant

coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.

3. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.

    a. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    b. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

    a. Fan discharges.
    b. Intervals of lined duct preceding unlined duct.
    c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.

9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.

    a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.

10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 4 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

C. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

F. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

2.7 SEISMIC-RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.; a division of Cooper Industries.
2. Ductmate Industries, Inc.
3. Hilti Corp.
4. Mason Industries.
5. TOLCO; a brand of NIBCO INC.
6. Unistrut Corporation; Tyco International, Ltd.

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by the Office of Statewide Health Planning and Development for the State of California.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

D. Restraint Cables: ASTM A 603, galvanized-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.

E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.

F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems" and ASCE/SEI 7.

1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
2. Brace a change of direction longer than 12 feet.

B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on ducts that are suspended with vibration isolators.

E. Install seismic-restraint devices using methods approved by the Office of Statewide Health Planning and Development for the State of California.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

G. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.6 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:

    a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections totaling no less than 25 percent of total installed duct area for each designated pressure class.
    b. Supply, Return, Outdoor Air, Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.

5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.9 DUCT CLEANING

A. Clean new and existing duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.

7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.10 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.11 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated.

B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units

a. Pressure Class: Positive 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

3. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

C. Return Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

    a. Pressure Class: Positive or negative 2-inch wg.
    b. Minimum SMACNA Seal Class: C.
    c. SMACNA Leakage Class for Rectangular: 24.
    d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units:

    a. Pressure Class: Positive or negative 2-inch wg.
    b. Minimum SMACNA Seal Class: C.
    c. SMACNA Leakage Class for Rectangular: 24.
    d. SMACNA Leakage Class for Round and Flat Oval: 12

3. Ducts Connected to Equipment Not Listed Above:

    a. Pressure Class: Positive or negative 2-inch wg.
    b. Minimum SMACNA Seal Class: C.
    c. SMACNA Leakage Class for Rectangular: 24.
    d. SMACNA Leakage Class for Round and Flat Oval: 12

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

    a. Pressure Class: Negative 2-inch wg.
    b. Minimum SMACNA Seal Class: C.
    c. SMACNA Leakage Class for Rectangular: 24.
    d. SMACNA Leakage Class for Round and Flat Oval: 12

2. Ducts Connected to Air-Handling Units:

    a. Pressure Class: Positive or negative 2-inch wg.
    b. Minimum SMACNA Seal Class: C.
    c. SMACNA Leakage Class for Rectangular: 24.
    d. SMACNA Leakage Class for Round and Flat Oval: 12

3. Ducts Connected to Commercial Kitchen Hoods: Comply with NFPA 96.

    a. Exposed to View: Type 304, stainless-steel sheet, No. 4 finish.
    b. Concealed: Type 304, stainless-steel sheet, No. 2D finish.
    c. Welded seams and joints.
    d. Pressure Class: Positive or negative 2-inch wg.
    e. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
    f. SMACNA Leakage Class: 3.

4. Ducts Connected to Dishwasher Hoods:

    a. Type 304, stainless-steel sheet.
    b. Exposed to View: No. 4 finish.
    c. Concealed: No. 2D finish.
    d. Welded seams and flanged joints with watertight EPDM gaskets.
    e. Pressure Class: Positive or negative 2-inch wg.

f. SMACNA Leakage Class: 3.

5. Ducts Connected to Fans Exhausting Laboratory and Process (ASHRAE 62.1, Class 3 and 4) Air:

a. Type 316, stainless-steel sheet.

1) Exposed to View: No. 4 finish.
2) Concealed: No. 2D finish.

b. Pressure Class: Positive or negative 2-inch wg.
c. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
d. SMACNA Leakage Class: 3.

6. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

2. Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

3. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

F. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.

G. Liner:

1. Supply and Return Air Ducts and Plenums: Fibrous glass, Type I, 1-1/2 inches thick.
2. Transfer Ducts: Fibrous glass, Type I, 2 inches thick.

H. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

    a. Velocity 1000 fpm or Lower:

        1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
        2) Mitered Type RE 4 without vanes.

    b. Velocity 1000 to 1500 fpm:

        1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
        2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
        3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

    c. Velocity 1500 fpm or Higher:

        1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
        2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
        3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

    a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
    b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
    c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

    a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

        1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
        2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
        3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
        4) Radius-to Diameter Ratio: 1.5.

    b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
    c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

I. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

    a. Rectangular Main to Rectangular Branch: 45-degree entry.
    b. Rectangular Main to Round Branch: Spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

    a. Velocity 1000 fpm or Lower: 90-degree tap.
    b. Velocity 1000 to 1500 fpm: Conical tap.
    c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

SECTION 233116

NONMETAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Underground Ducts.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for nonmetal ducts.
2. Section 233113 "Metal Ducts" for single- and double-wall, rectangular and round ducts.
3. Section 233300 "Air Duct Accessories" for dampers, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Unground Ducts.
2. Sealants and Gaskets

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Duct layout indicating sizes and pressure classes.
3. Elevation of top of ducts.
4. Dimensions of main duct runs from building grid lines.
5. Fittings.
6. Reinforcement and spacing.
7. Seam and joint construction.
8. Penetrations through fire-rated and other partitions.
9. Equipment installation based on equipment being used on Project.
10. Burial and supports, including methods for duct burial and internal and external bracing if recommended by the manufacturer.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:

a. Lighting fixtures.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Access panels.
f. Perimeter moldings.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

C. NFPA Compliance:

1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 UNDERGROUND DUCTWORK

A. Manufacturers: Subject to compliance with requirements:

1. AQD Industries LLC, AKDUCT (ICC-ES PMG-1023)
2. Or equal. Equal must comply with requirements of ICC-ES PMG-1023.

B. Underground Duct System:

1. Complete duct system (including inlet plenums, round duct, run-outs, diffuser boots, etc.) must be from one manufacturer and be of the same material, construction and connection method throughout. Field made duct components are NOT acceptable.

2. Provide elbows, ducts, diffuser boxes, plenums, clamp & gaskets, boots, saddle registers and caulk as required by drawings for underground installation.
3. Unless otherwise noted, all duct and fittings shall be constructed per SMACNA's Duct Construction Standards to withstand +10" w.g. and -2" w.g.
4. Ductwork shall be closed cell plastic material that is recyclable, does not emit volatile organic compounds, and conforms to ASTM-D2412. Ductwork shall be resistant to mildew, mold (UL 181B), and radon gas (BSS 7239-88). Ductwork shall not rust or crack under external stress or strain. Ductwork shall have integral R-10 equivalent thermal insulation value, without the use of external insulation, per NSF's P374 Protocol and verified by a NSF Thermal Testing Report.
5. All joints shall be sealed via gasket or bolts and sealant.
6. Clamps and gaskets shall be used on ductwork without flanges. Clamps shall be polyethylene with stainless steel plates and stainless-steel screws. Gaskets shall comprise of ¼" thick butyl rubber sealant tape that is water and UV resistant and shall not stain. Gaskets shall comply with ASTM-E84 for flame and smoke spread.
7. Flanged joints and duct branches shall use a co-polymer adhesive caulking sealant that is water and UV resistant. Flanges shall be connected with stainless steel bolts.
8. Assembled ductwork shall be able to maintain pressure with no leakage.
9. Duct system shall be installed by an AQC Industries' trained installer.
10. Fiberglass style (FRP) ductwork or PVC coated galvanized steel ductwork shall NOT be acceptable.
11. Duct system performance shall exceed SMACNA's Leakage Class 1 requirements at the system design static pressure.
12. Duct system shall carry a 10-year Limited Warranty.

PART 3 - PRODUCTS

3.1 DUCT INSTALLATION

A. Install ducts with fewest possible joints.

B. Protect duct interiors from the moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

C. Follow The BlueDuct Installation Instructions provided by AQC Industries. It is strongly recommended to complete installation training provided by AQC Industries prior to installation

D. Excavate a trench evenly as per The Blue Duct Installation Instructions. No bedding is required except for cases of bedrock or clay where sand or light aggregate may be used.

E. Backfill material must consist of pea gravel or dry silica sand.

F. The sealant and gasket material provided by AQC Industries must be used as directed. The use of non-approved sealant or gasket will void warranty.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:

    a. Underground Supply Ducts: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of nonmetal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

    a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.3 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch duct as recommended by duct manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).

2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
2. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of ducts or duct accessories.
3. Clean fibrous-glass duct with HEPA vacuuming equipment; do not permit duct to get wet. Replace fibrous-glass duct that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
4. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
5. Provide drainage and cleanup for wash-down procedures.
6. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.4 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

END OF SECTION 233116

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Fire dampers.
6. Ceiling radiation dampers.
7. Combination fire and smoke dampers.
8. Flange connectors.
9. Duct silencers.
10. Turning vanes.
11. Remote damper operators.
12. Duct-mounted access doors.
13. Flexible connectors.
14. Flexible ducts.
15. Duct accessory hardware.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

B. LEED Submittals:

1. Product Data for Prerequisite IEQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
2. Product Data for Prerequisite EA 2: Documentation indicating that duct insulation R-values comply with tables in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air Conditioning."

C. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

    a. Special fittings.
    b. Manual volume damper installations.
    c. Control-damper installations.
    d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
    e. Duct security bars.
    f. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

    1. Galvanized Coating Designation: G90.
    2. Exposed-Surface Finish: Mill phosphatized.

B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and finish for exposed ducts.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.

B. Description: Gravity balanced.

C. Maximum Air Velocity: 2500 fpm.

D. Maximum System Pressure: 2-inch wg.

E. Frame: Hat-shaped, 18-gage galvanized sheet steel, with welded corners or mechanically attached and mounting flange.

F. Blades: Multiple single-piece blades, center pivoted, maximum 6-inch width, 0.025-inch- thick, roll-formed aluminum with sealed edges.

G. Blade Action: Parallel.

H. Blade Seals: Extruded vinyl, mechanically locked.

I. Blade Axles:

1. Material: Plated steel.
2. Diameter: 0.20 inch.

J. Tie Bars and Brackets: Galvanized steel.

K. Return Spring: Adjustable tension.

L. Bearings: Synthetic pivot bushings.

M. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Chain pulls.
4. Screen Mounting: Front mounted in sleeve.
    a. Sleeve Thickness: 20 gage minimum.
    b. Sleeve Length: 6 inches minimum.
5. Screen Mounting: Rear mounted.
6. Screen Material: Galvanized steel.
7. Screen Type: Bird.
8. 90-degree stops.

2.4 BAROMETRIC RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.

B. Suitable for horizontal or vertical mounting.

C. Maximum Air Velocity: 2000 fpm.

D. Maximum System Pressure: 2-inch wg.

E. Frame: Hat-shaped, 16-gage, galvanized sheet steel with welded corners or mechanically attached and mounting flange.

F. Blades:

1. Multiple, 0.025-inch- thick, roll-formed alumrinum.
2. Maximum Width: 6 inches.
3. Action: Parallel.
4. Balance: Gravity.
5. Eccentrically pivoted.

G. Blade Seals: Vinyl.

H. Blade Axles: Plated steel.

I. Tie Bars and Brackets:

1. Material: Galvanized steel.
2. Rattle free with 90-degree stop.

J. Return Spring: Adjustable tension.

K. Bearings: Ball.

L. Accessories:

1. Flange on intake.
2. Adjustment device to permit setting for varying differential static pressures.

2.5 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Nailor Industries Inc.
b. Pottorff.

c. Ruskin Company.
d. Trox USA Inc.

2. Standard leakage rating.
3. Suitable for horizontal or vertical applications.
4. Frames:

a. Frame: Hat-shaped, 20-gage, galvanized sheet steel.
b. Mitered and welded corners.
c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Stiffen damper blades for stability.
d. Galvanized-steel, 0.064 inch thick.

6. Blade Axles: Plated steel.
7. Bearings:

a. Molded synthetic.
b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Galvanized steel.

2.6 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.
4. Young Regulator Company.

B. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:

1. Hat shaped.
2. 16-gage, galvanized sheet steel.
3. Reinforced corners.

D. Blades:

1. Multiple blade with maximum blade width of 6 inches.
2. Opposed-blade design.
3. Aluminum.
4. 0.063 inch thick single skin.
5. Blade Edging: TPE.

E. Blade Axles: 1/2-inch- diameter; plated steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F.

F. Bearings:

1. Molded synthetic.
2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.7 FIRE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.

B. Type: Static and dynamic; rated and labeled according to UL 555 by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000-fpm velocity.

D. Fire Rating: 1-1/2 and 3 hours.

E. Frame: Curtain type with blades outside airstream, fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.

F. Mounting Sleeve: Factory-installed, galvanized sheet steel.

1. Minimum Thickness: 0.138 inch thick, and of length to suit application.

G. Mounting Orientation: Vertical or horizontal as indicated.

H. Blades: Roll-formed, interlocking, 0.034-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.

I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

J. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.

2.8 CEILING RADIATION DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.

B. General Requirements:

1. Labeled according to UL 555C by an NRTL.
2. Comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."

C. Frame: Galvanized sheet steel, round or rectangular, style to suit ceiling construction.

D. Blades: Galvanized sheet steel with refractory insulation.

E. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.

F. Fire Rating: 1 hour.

2.9 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.

B. Type: Dynamic; rated and labeled according to UL 555 and UL 555S by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000-fpm velocity.

D. Fire Rating: 1-1/2 and 3 hours.

E. Frame: Hat-shaped, 0.094-inch- thick, galvanized sheet steel, with welded or mechanically attached corners and mounting flange.

F. Heat-Responsive Device: Electric resettable device and switch package, factory installed, rated.

G. Smoke Detector: Integral, factory wired for single-point connection.

H. Blades: Roll-formed, horizontal, interlocking, 16-gage, galvanized sheet steel.

I. Leakage: Class II.

J. Rated pressure and velocity to exceed design airflow conditions.

K. Mounting Sleeve: Factory-installed, 0.039-inch-thick, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone calking.

L. Master control panel for use in dynamic smoke-management systems.

M. Damper Motors: Two-position action.

N. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230900 "Instrumentation and Control for HVAC."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
7. Electrical Connection: 115 V, single phase, 60 Hz.

O. Accessories:

1. Test and reset switches, remote mounted.

2.10 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Nexus PDQ; Division of Shilco Holdings Inc.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Description: Roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.11 DUCT SILENCERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dynasonics.
2. Industrial Noise Control, Inc.
3. McGill AirFlow LLC.
4. Ruskin Company.
5. Vibro-Acoustics.

B. General Requirements:

1. Factory fabricated.

2. Fire-Performance Characteristics: Adhesives, sealants, packing materials, and accessory materials shall have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E 84.
3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

C. Shape:

1. Rectangular straight with splitters or baffles.
2. Round straight with center bodies or pods.
3. Rectangular elbow with splitters or baffles.
4. Round elbow with center bodies or pods.
5. Rectangular transitional with splitters or baffles.

D. Rectangular Silencer Outer Casing: ASTM A 653/A 653M, G90, galvanized sheet steel, 0.040 inch thick.

E. Round Silencer Outer Casing: ASTM A 653/A 653M, G90, galvanized sheet steel.

1. Sheet Metal Thickness for Units up to 24 Inches in Diameter: 0.034 inch thick.
2. Sheet Metal Thickness for Units 26 through 40 Inches in Diameter: 0.040 inch thick.
3. Sheet Metal Thickness for Units 42 through 52 Inches in Diameter: 0.05 inch thick.
4. Sheet Metal Thickness for Units 54 through 60 Inches in Diameter: 0.064 inch thick.

F. Inner Casing and Baffles: ASTM A 653/A 653M, G90 galvanized sheet metal, 0.034 inch thick, and with 1/8-inch- diameter perforations.

G. Special Construction:

1. Suitable for outdoor use.
2. High transmission loss.

H. Connection Sizes: Match connecting ductwork unless otherwise indicated.

I. Principal Sound-Absorbing Mechanism:

1. Controlled impedance membranes and broadly tuned resonators without absorptive media.
2. Film-lined type with fill material.

a. Fill Material: Inert and vermin-proof fibrous material, packed under not less than 15 percent compression.
b. Erosion Barrier: Polymer bag enclosing fill, and heat sealed before assembly.

3. Lining: Mylar.

J. Fabricate silencers to form rigid units that will not pulsate, vibrate, rattle, or otherwise react to system pressure variations. Do not use mechanical fasteners for unit assemblies.

1. Joints: Lock formed and sealed.
2. Suspended Units: Factory-installed suspension hooks or lugs attached to frame in quantities and spaced to prevent deflection or distortion.
3. Reinforcement: Cross or trapeze angles for rigid suspension.

K. Accessories:

1. Factory-installed end caps to prevent contamination during shipping.
2. Removable splitters.

L. Source Quality Control: Test according to ASTM E 477.
1. Record acoustic ratings, including dynamic insertion loss and generated-noise power levels with an airflow of at least 2000-fpm face velocity.
2. Leak Test: Test units for airtightness at 200 percent of associated fan static pressure or 6-inch wg static pressure, whichever is greater.

2.12 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. METALAIRE, Inc.
4. SEMCO Incorporated.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

E. Vane Construction: Double wall.

2.13 REMOTE DAMPER OPERATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Pottorff.
2. Ventfabrics, Inc.
3. Young Regulator Company.

B. Description: Cable system designed for remote manual damper adjustment.

C. Tubing: Galvanized spiral wire sheath.

D. Cable: Stainless steel.

E. Wall-Box Mounting: Recessed.

F. Wall-Box Cover-Plate Material: Steel.

2.14 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Greenheck Fan Corporation.
3. Pottorff.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

   a. Double wall, rectangular.
   b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
   c. Vision panel.
   d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
   e. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:

   a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
   b. Access Doors up to 18 Inches Square: Continuous and two sash locks.
   c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.
   d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.

C. Pressure Relief Access Door:

1. Door and Frame Material: Galvanized sheet steel.
2. Door: Single wall or double wall with insulation fill with metal thickness applicable for duct pressure class.
3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
4. Factory set.
5. Doors close when pressures are within set-point range.
6. Hinge: Continuous piano.
7. Latches: Cam.
8. Seal: Neoprene or foam rubber.
9. Insulation Fill: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.15 DUCT ACCESS PANEL ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Flame Gard, Inc.
3. 3M.

B. Labeled according to UL 1978 by an NRTL.

C. Panel and Frame: Minimum thickness 11-gage carbon steel.

D. Fasteners: Carbon steel. Panel fasteners shall not penetrate duct wall.

E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.

F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.16 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

G. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.

1. Minimum Weight: 16 oz./sq. yd..
2. Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

H. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.

1. Minimum Weight: 14 oz./sq. yd..
2. Tensile Strength: 450 lbf/inch in the warp and 340 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

I. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.17 FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Insulated, Flexible Duct: UL 181, Class 1, polyethylene film supported by helically wound, galvanized-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 5500 fpm.
3. Temperature Range: Minus 10 to plus 160 deg F.
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.

C. Flexible Duct Connectors:

1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.

2. Non-Clamp Connectors: Adhesive plus sheet metal screws.

2.18 DUCT SECURITY BARS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carnes.
2. KEES, Inc.
3. Lloyd Industries, Inc.
4. Metal Form Manufacturing, Inc.
5. Price Industries.

B. Description: Factory-fabricated and field-installed duct security bars.

C. Configuration:

1. Frame: 2-1/2 by 2-1/2 by 1/4 inch angle.
2. Sleeve: 0.1345-inch, continuously welded steel frames with 1-by-1-by-3/16-inch angle frame factory welded to 1 end. To be poured in place or set with concrete block or welded or bolted to wall, one side only. Duct connections on both sides.
3. Horizontal Bars: 1/2 inch.
4. Vertical Bars: 1/2 inch.
5. Bar Spacing: 6 inches.
6. Mounting: Bolted or welded.

D. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

E. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install fire and smoke dampers according to UL listing.

H. Connect ducts to duct silencers rigidly.

I. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.

2. Upstream from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-foot spacing.
8. Upstream from turning vanes.
9. Upstream or downstream from duct silencers.
10. Control devices requiring inspection.
11. Elsewhere as indicated.

J. Install access doors with swing against duct static pressure.

K. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

L. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

M. Install flexible connectors to connect ducts to equipment.

N. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

O. Connect diffusers to ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

P. Connect flexible ducts to metal ducts with draw bands.

Q. Install duct test holes where required for testing and balancing purposes.

R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.

3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

SECTION 23 34 23

HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Utility set fans.
2. Centrifugal roof ventilators.
3. Ceiling-mounted ventilators.
4. In-line centrifugal fans.

1.3 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base fan-performance ratings on actual project site elevations.

B. Operating Limits: Classify according to AMCA 99.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. Roof curbs.
7. Fan speed controllers.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Roof framing and support members relative to duct penetrations.
2. Ceiling suspension assembly members.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set for each belt-driven unit.

1.8 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.9 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate sizes and locations of concrete bases with actual equipment provided.

C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 UTILITY SET FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Loren Cook Company.
3. Aerovent; a division of Twin City Fan Companies, Ltd.

B. Housing: Fabricated of galvanized steel with side sheets fastened with a deep lock seam or welded to scroll sheets.

1. Housing Discharge Arrangement: Adjustable to eight standard positions.

C. Fan Wheels: Single-width, single inlet; welded to cast-iron or cast-steel hub and spun-steel inlet cone, with hub keyed to shaft.

1. Blade Materials: Steel.
2. Blade Type: Backward inclined.

D. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.

E. Shaft Bearings: Prelubricated and sealed, self-aligning, pillow-block-type ball bearings with ABMA 9, L_{50} of 200,000 hours.

1. Extend grease fitting to accessible location outside of unit.

F. Belt Drives:

1. Factory mounted, with final alignment and belt adjustment made after installation
2. Service Factor Based on Fan Motor Size: 1.5.
3. Motor Pulleys: Adjustable pitch for use with motors through **5** hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
4. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
5. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.

G. Accessories:

1. Inlet and Outlet: Flanged.
2. Companion Flanges: Rolled flanges for duct connections of same material as housing.
3. Backdraft Dampers: Gravity actuated with counterweight and interlocking aluminum blades with felt edges in steel frame installed on fan discharge.
4. Access Door: Gasketed door in scroll with latch-type handles.
5. Inlet Screens: Removable wire mesh.
6. Drain Connections: NPS 3/4 threaded coupling drain connection installed at lowest point of housing.
7. Weather Hoods: Weather resistant with stamped vents over motor and drive compartment.

2.2 CENTRIFUGAL ROOF VENTILATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Loren Cook Company.
3. Aerovent; a division of Twin City Fan Companies, Ltd.

B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.

1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.

C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

D. Belt Drives:

1. Resiliently mounted to housing.
2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
4. Pulleys: Cast-iron, adjustable-pitch motor pulley.
5. Fan and motor isolated from exhaust airstream.

E. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
5. .

F. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.

1. Configuration: Built-in cant and mounting flange.
2. Overall Height: As required to maintain 12” above finish roof.
3. Sound Curb: Curb with sound-absorbing insulation.
4. Pitch Mounting: Manufacture curb for roof slope.
5. Metal Liner: Galvanized steel.

2.3 CEILING-MOUNTED VENTILATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Loren Cook Company.
3. Aerovent; a division of Twin City Fan Companies, Ltd.

B. Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Plastic or painted aluminum, louvered grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
3. Time-Delay Switch: Assembly with single-pole rocker switch, timer, and cover plate.
4. Motion Sensor: Motion detector with adjustable shutoff timer.
5. Ceiling Radiation Damper: Fire-rated assembly with ceramic blanket, stainless-steel springs, and fusible link.
6. Filter: Washable aluminum to fit between fan and grille.
7. Isolation: Rubber-in-shear vibration isolators.
8. Manufacturer's standard roof jack or wall cap, and transition fittings.

2.4 IN-LINE CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Loren Cook Company.
3. Aerovent; a division of Twin City Fan Companies, Ltd.

B. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

C. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door.

D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

E. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.

F. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
3. Companion Flanges: For inlet and outlet duct connections.
4. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
5. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.

6. Vibration Isolators:

   a. Type: Spring hangers.
   b. Static Deflection: 1 inch.

2.5 MOTORS

A. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Enclosure Type: Totally enclosed, fan cooled.

2.6 SOURCE QUALITY CONTROL

A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Equipment Mounting:

   1. Install power ventilators on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in other sections.
   2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

C. Secure roof-mounted fans to roof curbs with cadmium-plated hardware. See Section 077200 "Roof Accessories" for installation of roof curbs.

D. Ceiling Units: Suspend units from structure; use steel wire or metal straps.

E. Support suspended units from structure using threaded steel rods and spring hangers having a static deflection of 1 inch. Vibration-control devices are specified in Section 230548 "Vibration and Seismic Controls for HVAC."

F. Install units with clearances for service and maintenance.

G. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
10. Shut unit down and reconnect automatic temperature-control operators.
11. Remove and replace malfunctioning units and retest as specified above.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

D. Replace fan and motor pulleys as required to achieve design airflow.

E. Lubricate bearings.

END OF SECTION 233423

SECTION 23 37 13

AIR DIFFUSERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Round ceiling diffusers.
2. Modular core, square ceiling diffusers.
3. Perforated diffusers.
4. Linear bar diffusers.
5. Linear slot diffusers.

B. Related Sections:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

A. Round Ceiling Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Price Industries.
   b. Titus.
   c. Anemostat Products; a Mestek company.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.
5. Face Style: Three cone.
6. Mounting: Duct connection.
7. Pattern: Two-position horizontal.

B. Modular Core, Square Ceiling Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Price Industries.
   b. Titus.
   c. Anemostat Products; a Mestek company.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.
5. Face Style: Modular Core.
6. Mounting: Surface.
7. Pattern: Adjustable.

C. Perforated Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Price Industries.
   b. Titus.
   c. Anemostat Products; a Mestek company.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.
5. Duct Inlet: Square.
6. Face Style: Flush.
7. Mounting: T-bar.
8. Pattern Controller: Adjustable with louvered pattern modules at inlet.

2.2 CEILING LINEAR SLOT OUTLETS

A. Linear Bar Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Price Industries.
    b. Titus.
    c. Anemostat Products; a Mestek company.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.
5. Narrow Core Spacing Arrangement: 1/8-inch-thick blades spaced 1/4 inch apart, zero-degree deflection.
6. One-Way Deflection Vanes: Extruded construction fixed louvers with removable core.
7. Mounting: Concealed bracket.
8. Accessories: Blank-off strips.

B. Linear Slot Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Price Industries.
    b. Titus.
    c. Anemostat Products; a Mestek company.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material - Shell: Aluminum.
4. Material - Pattern Controller: Steel.
5. Finish: Baked enamel, color selected by Architect.
6. Slot Width: As indicated on plans.
7. Number of Slots: As indicated on plans.
8. Length: As indicated on plans.

2.3 REGISTERS AND GRILLES

A. Adjustable Bar Grille:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Price Industries.
    b. Titus.
    c. Anemostat Products; a Mestek company.

2. Material: Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Horizontal spaced 3/4 inch apart.
5. Core Construction: Integral.
6. Rear-Blade Arrangement: Vertical spaced 3/4 inch apart.
7. Mounting: Concealed.

2.4 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

SECTION 23 37 23

HVAC GRAVITY VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof hoods.
2. Goosenecks.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Ventilators shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of ventilator components, noise or metal fatigue caused by ventilator blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.

B. Seismic Performance: Ventilators, including attachments to other construction, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints, overstressing of components, failure of connections, or other detrimental effects.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Water Entrainment: Limit water penetration through unit to comply with ASHRAE 62.1.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. For louvered-penthouse ventilators specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For gravity ventilators. Include plans, elevations, sections, details, ventilator attachments to curbs, and curb attachments to roof structure.

1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof framing plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members to which roof curbs and ventilators will be attached.
2. Sizes and locations of roof openings.

B. Seismic Qualification Certificates: For ventilators, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Welding certificates.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.7 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5 or T-52.

B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming or as otherwise recommended by metal producer for required finish.

C. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 zinc coating, mill phosphatized.

D. Stainless-Steel Sheet: ASTM A 666, Type 304, with No. 4 finish.

E. Fasteners: Same basic metal and alloy as fastened metal or 300 Series stainless steel unless otherwise indicated. Do not use metals that are incompatible with joined materials.

1. Use types and sizes to suit unit installation conditions.
2. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.

F. Post-Installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors made from stainless-steel components, with capability to sustain without failure a load equal to 4 times the loads imposed for concrete, or 6 times the load imposed for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL

A. Factory or shop fabricate gravity ventilators to minimize field splicing and assembly. Disassemble units to the minimum extent as necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

B. Fabricate frames, including integral bases, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

C. Fabricate units with closely fitted joints and exposed connections accurately located and secured.

D. Fabricate supports, anchorages, and accessories required for complete assembly.

E. Perform shop welding by AWS-certified procedures and personnel.

2.3 ROOF HOODS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aerovent.
2. Greenheck Fan Corporation.
3. Loren Cook Company.

B. Factory or shop fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figures 6-6 and 6-7.

C. Materials: Galvanized-steel sheet, minimum 0.064-inch- thick base and 0.040-inch- thick hood; suitably reinforced.

D. Roof Curbs: Galvanized-steel sheet; with mitered and welded corners; 1-1/2-inch- thick, rigid fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to fit roof opening and ventilator base.

1. Configuration: Built-in cant and mounting flange.

2. Overall Height: 12 inches.

E. Bird Screening: Galvanized-steel, 1/2-inch- square mesh, 0.041-inch wire.

F. Insect Screening: Aluminum, 18-by-16 mesh, 0.012-inch wire.

G. Galvanized-Steel Sheet Finish:

1. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating suited to the organic coating to be applied over it.
2. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply an air-dried primer immediately after cleaning and pretreating.
3. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat and an overall minimum dry film thickness of 2 mils.

a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.4 GOOSENECKS

A. Factory or shop fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 6-5; with a minimum of 0.052-inch- thick, galvanized-steel sheet.

B. Roof Curbs: Galvanized-steel sheet; with mitered and welded corners; 1-1/2-inch- thick, rigid fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to fit roof opening and ventilator base.

1. Configuration: Built-in cant and mounting flange.
2. Overall Height: 18 inches.

C. Bird Screening: Galvanized-steel, 1/2-inch- square mesh, 0.041-inch wire.

D. Insect Screening: Aluminum, 18-by-16 mesh, 0.012-inch wire.

E. Galvanized-Steel Sheet Finish:

1. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating suited to the organic coating to be applied over it.
2. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply an air-dried primer immediately after cleaning and pretreating.
3. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat and an overall minimum dry film thickness of 2 mils.

a. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install gravity ventilators level, plumb, and at indicated alignment with adjacent work.

B. Install goosenecks on curb base where throat size exceeds 9 by 9 inches.

C. Install gravity ventilators with clearances for service and maintenance.

D. Install perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Install concealed gaskets, flashings, joint fillers, and insulation as installation progresses. Comply with Section 079200 "Joint Sealants" for sealants applied during installation.

F. Label gravity ventilators according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

G. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

H. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

3.2 CONNECTIONS

A. Duct installation and connection requirements are specified in Section 233113 "Metal Ducts" and Section 233116 "Nonmetal Ducts." Drawings indicate general arrangement of ducts and duct accessories.

3.3 ADJUSTING

A. Adjust damper linkages for proper damper operation.

END OF SECTION 233723

SECTION 23 74 13

PACKAGED, OUTDOOR, CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:

1. Direct-expansion cooling.
2. Heat-pump refrigeration components.
3. Hot-gas reheat.
4. Gas furnace.
5. Economizer outdoor- and return-air damper section.
6. Integral, space temperature controls.
7. Roof curbs.

1.3 DEFINITIONS

A. DDC: Direct-digital controls.

B. ECM: Electrically commutated motor.

C. Outdoor-Air Refrigerant Coil: Refrigerant coil in the outdoor-air stream to reject heat during cooling operations and to absorb heat during heating operations. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.

D. Outdoor-Air Refrigerant-Coil Fan: The outdoor-air refrigerant-coil fan in RTUs. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.

E. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, outdoor, central-station air-handling units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.

F. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

G. Supply-Air Refrigerant Coil: Refrigerant coil in the supply-air stream to absorb heat (provide cooling) during cooling operations and to reject heat (provide heating) during heating operations. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

H. VVT: Variable-air volume and temperature.

1.4 ACTION SUBMITTALS

A. Product Data: Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Structural members to which RTUs will be attached.
2. Roof openings
3. Roof curbs and flashing.

B. Manufacturer Wind Loading Qualification Certification: Submit certification that specified equipment will withstand wind forces identified in "Performance Requirements" Article and in Section 230548 "Vibration and Seismic Controls for HVAC."

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculations.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of wind force and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Manufacturer Seismic Qualification Certification: Submit certification that RTUs, accessories, and components will withstand seismic forces defined in "Performance Requirements" Article and in Section 230548 "Vibration and Seismic Controls for HVAC."

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Field quality-control test reports.

E. Warranty: Special warranty specified in this Section.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fan Belts: One set for each belt-driven fan.
2. Filters: One set of filters for each unit.

1.8 QUALITY ASSURANCE

A. ARI Compliance:

1. Comply with ARI 203/110 and ARI 303/110 for testing and rating energy efficiencies for RTUs.
2. Comply with ARI 270 for testing and rating sound performance for RTUs.

B. ASHRAE Compliance:

1. Comply with ASHRAE 15 for refrigeration system safety.
2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
3. Comply with applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

D. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.

E. UL Compliance: Comply with UL 1995.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of RTUs that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.
2. Warranty Period for Gas Furnace Heat Exchangers: Manufacturer's standard, but not less than five years from date of Substantial Completion.
3. Warranty Period for Solid-State Ignition Modules: Manufacturer's standard, but not less than three years from date of Substantial Completion.
4. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aaon.
2. Or Equal.

2.2 CASING

A. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.

B. Exterior Casing Material: Galvanized steel with factory-painted finish, with pitched roof panels and knockouts with grommet seals for electrical and piping connections and lifting lugs.

1. Exterior Casing Thickness: 0.052 inch thick.

C. Inner Casing Fabrication Requirements:

1. Inside Casing: Galvanized steel, 0.034 inch thick.

D. Casing Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.

1. Materials: ASTM C 1071, Type I.
2. Thickness: 1/2 inch
3. Liner materials shall have air-stream surface coated with an erosion- and temperature-resistant coating or faced with a plain or coated fibrous mat or fabric.
4. Liner Adhesive: Comply with ASTM C 916, Type I.

E. Condensate Drain Pans: Formed sections of galvanized steel sheet, a minimum of 2 inches deep, and complying with ASHRAE 62.1.

1. Double-Wall Construction: Fill space between walls with foam insulation and seal moisture tight.
2. Drain Connections: Threaded nipple.
3. Pan-Top Surface Coating: Corrosion-resistant compound.

F. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

2.3 FANS

A. Direct-Driven Supply-Air Fans: Double width, forward curved, centrifugal; with permanently lubricated, ECM motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.

B. Belt-Driven Supply-Air Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the casing. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.

C. Condenser-Coil Fan: Propeller, mounted on shaft of permanently lubricated motor.

D. Seismic Fabrication Requirements: Fabricate fan section, internal mounting frame and attachment to fans, fan housings, motors, casings, accessories, and other fan section components with reinforcement strong enough to withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC" when fan-mounted frame and RTU-mounted frame are anchored to building structure.

2.4 COILS

A. Supply-Air Refrigerant Coil:

1. Aluminum-plate fin and seamless internally grooved copper tube in steel casing with equalizing-type vertical distributor.
2. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.
3. Coil Split: Interlaced.
4. Condensate Drain Pan: Galvanized steel with corrosion-resistant coating formed with pitch and drain connections complying with ASHRAE 62.1.

2.5 REFRIGERANT CIRCUIT COMPONENTS

A. Compressor: Hermetic, scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief.

B. Refrigeration Specialties:

1. Refrigerant: R-410A.
2. Expansion valve with replaceable thermostatic element.
3. Refrigerant filter/dryer.
4. Manual-reset high-pressure safety switch.
5. Automatic-reset low-pressure safety switch.
6. Minimum off-time relay.
7. Automatic-reset compressor motor thermal overload.
8. Brass service valves installed in compressor suction and liquid lines.

2.6 AIR FILTRATION

A. Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.

1. Pleated: MERV 13.

2.7 GAS FURNACE

A. Description: Factory assembled, piped, and wired; complying with ANSI Z21.47 and NFPA 54.

1. CSA Approval: Designed and certified by and bearing label of CSA.

B. Burners: Stainless steel.

1. Fuel: Natural gas.
2. Ignition: Electronically controlled electric spark or hot-surface igniter with flame sensor.

C. Heat-Exchanger and Drain Pan: Stainless steel.

D. Venting: Gravity vented.

E. Safety Controls:

1. Gas Control Valve: Modulating.
2. Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff.

2.8 DAMPERS

A. Outdoor- and Return-Air Mixing Dampers: Parallel- or opposed-blade galvanized-steel dampers mechanically fastened to cadmium plated for galvanized-steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.

1. Damper Motor: Modulating with adjustable minimum position.
2. Relief-Air Damper: Gravity actuated or motorized, as required by ASHRAE/IESNA 90.1, with bird screen and hood.

2.9 ELECTRICAL POWER CONNECTION

A. Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.

2.10 CONTROLS

A. Control equipment and sequence of operation are specified in Section 230900 "Instrumentation and Control for HVAC."

B. DDC Controller:

1. Controller shall have volatile-memory backup.
2. Safety Control Operation:

a. Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire alarm control panel.
b. Fire Alarm Control Panel Interface: Provide control interface to coordinate with operating sequence described in Section 283111 "Digital, Addressable Fire-Alarm System" and Section 283112 "Zoned (DC Loop) Fire-Alarm System."
c. Low-Discharge Temperature: Stop fan and close outdoor-air damper if supply air temperature is less than 40 deg F.

3. Scheduled Operation: Occupied and unoccupied periods on 365-day clock with a minimum of four programmable periods per day.
4. Unoccupied Period:

    a. Heating Setback: 50 deg F.
    b. Cooling Setback: System off.
    c. Override Operation: Two hours.

5. Supply Fan Operation:

    a. Occupied Periods: Run fan continuously.
    b. Unoccupied Periods: Cycle fan to maintain setback temperature.

6. Refrigerant Circuit Operation:

    a. Occupied Periods: Cycle or stage compressors, and operate hot-gas bypass to match compressor output to cooling load to maintain room temperature. Cycle condenser fans to maintain maximum hot-gas pressure. Operate low-ambient control kit to maintain minimum hot-gas pressure.
    b. Unoccupied Periods: Cycle compressors and condenser fans for heating to maintain setback temperature.
    c. Switch reversing valve for heating or cooling mode on air-to-air heat pump.

7. Hot-Gas Reheat-Coil Operation:

    a. Occupied Periods: Humidistat opens hot-gas valve to provide hot-gas reheat, and cycles compressor.
    b. Unoccupied Periods: Reheat not required.

8. Gas Furnace Operation:

    a. Occupied Periods: Modulate burner to maintain room temperature.
    b. Unoccupied Periods: Cycle burner to maintain setback temperature.

9. Economizer Outdoor-Air Damper Operation:

    a. Occupied Periods: Open to minimum position as determined during air balancing procedure to obtain code required minimum outside air quantities. Controller shall permit air-side economizer operation when outdoor air is less than 60 deg F. Use outdoor-air temperature to adjust mixing dampers. Start relief-air fan with end switch on outdoor-air damper. During economizer cycle operation, lock out cooling.
    b. Unoccupied Periods: Close outdoor-air damper and open return-air damper.

10. Carbon Dioxide Sensor Operation:

    a. Occupied Periods: Reset minimum outdoor-air ratio down to minimum 10 percent to maintain maximum 1000-ppm concentration.
    b. Unoccupied Periods: Close outdoor-air damper and open return-air damper.

11. VVT Relays:

    a. Provide heating- and cooling-mode changeover relays compatible with VVT terminal control system required in Section 233600 "Air Terminal Units" and Section 230900 "Instrumentation and Control for HVAC."

C. Interface Requirements for HVAC Instrumentation and Control System:

1. Interface relay for scheduled operation.
2. Interface relay to provide indication of fault at the central workstation and diagnostic code storage.
3. Provide BACnet or LonWorks compatible interface for central HVAC control workstation for the following:

a. Adjusting set points.
b. Monitoring supply fan start, stop, and operation.
c. Inquiring data to include outdoor-air damper position, supply- and room-air temperature.
d. Monitoring occupied and unoccupied operations.
e. Monitoring constant and variable motor loads.
f. Monitoring variable-frequency drive operation.
g. Monitoring cooling load.
h. Monitoring economizer cycles.
i. Monitoring air-distribution static pressure and ventilation air volume.

2.11 ACCESSORIES

A. Coil guards of painted, galvanized-steel wire.

2.12 ROOF CURBS

A. Roof curbs with vibration isolators and wind or seismic restraints are specified in Section 230548 "Vibration and Seismic Controls for HVAC."

B. Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards.

1. Curb Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.

a. Materials: ASTM C 1071, Type I or II.
b. Thickness: 1 inch.

2. Application: Factory applied with adhesive and mechanical fasteners to the internal surface of curb.

a. Liner Adhesive: Comply with ASTM C 916, Type I.
b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
c. Liner materials applied in this location shall have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service air velocity.

C. Curb Height: 14 inches.

D. Wind and Seismic Restraints: Metal brackets compatible with the curb and casing, painted to match RTU, used to anchor unit to the curb, and designed for loads at Project site. Comply with

requirements in Section 230548 "Vibration and Seismic Controls for HVAC" for wind-load requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where RTUs will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Equipment Mounting:

1. Install RTUs on cast-in-place concrete equipment bases.
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

B. Roof Curb: Install on roof structure or concrete base, level and secure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." Install RTUs on curbs and coordinate roof penetrations and flashing with roof construction specified in Section 077200 "Roof Accessories." Secure RTUs to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts.

C. Unit Support: Install unit level on structural curbs. Coordinate wall penetrations and flashing with wall construction. Secure RTUs to structural support with anchor bolts.

3.3 CONNECTIONS

A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.

B. Install piping adjacent to RTUs to allow service and maintenance.

1. Gas Piping: Connect gas piping to burner, full size of gas train inlet, and connect with union and shutoff valve with sufficient clearance for burner removal and service.

C. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at top of roof curb.

2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Connect supply ducts to RTUs with flexible duct connectors specified in Section 233300 "Air Duct Accessories."
4. Install return-air duct continuously through roof structure.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing.

C. Tests and Inspections:

1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to furnace combustion chamber.
3. Inspect for visible damage to compressor, coils, and fans.
4. Inspect internal insulation.
5. Verify that labels are clearly visible.
6. Verify that clearances have been provided for servicing.
7. Verify that controls are connected and operable.
8. Verify that filters are installed.
9. Clean condenser coil and inspect for construction debris.
10. Clean furnace flue and inspect for construction debris.
11. Connect and purge gas line.
12. Remove packing from vibration isolators.
13. Inspect operation of barometric relief dampers.
14. Verify lubrication on fan and motor bearings.
15. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
16. Adjust fan belts to proper alignment and tension.

17. Start unit according to manufacturer's written instructions.

    a. Start refrigeration system.
    b. Do not operate below recommended low-ambient temperature.
    c. Complete startup sheets and attach copy with Contractor's startup report.

18. Inspect and record performance of interlocks and protective devices; verify sequences.
19. Operate unit for an initial period as recommended or required by manufacturer.
20. Perform the following operations for both minimum and maximum firing. Adjust burner for peak efficiency.

    a. Measure gas pressure on manifold.
    b. Inspect operation of power vents.
    c. Measure combustion-air temperature at inlet to combustion chamber.
    d. Measure flue-gas temperature at furnace discharge.
    e. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
    f. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.

21. Calibrate thermostats.
22. Adjust and inspect high-temperature limits.
23. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
24. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F above return-air temperature:

    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry- and wet-bulb temperatures.
    c. Outdoor-air, dry-bulb temperature.
    d. Outdoor-air-coil, discharge-air, dry-bulb temperature.

25. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
26. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

    a. Supply-air volume.
    b. Return-air volume.
    c. Relief-air volume.
    d. Outdoor-air intake volume.

27. Simulate maximum cooling demand and inspect the following:

    a. Compressor refrigerant suction and hot-gas pressures.
    b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.

28. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:

    a. High-temperature limit on gas-fired heat exchanger.
    b. Low-temperature safety operation.
    c. Filter high-pressure differential alarm.
    d. Economizer to minimum outdoor-air changeover.
    e. Relief-air fan operation.

f. Smoke and firestat alarms.

29. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site during other-than-normal occupancy hours for this purpose.

B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs. Refer to Section 017900 "Demonstration and Training."

END OF SECTION 237413

SECTION 23 81 26

SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set for each air-handling unit.
2. Gaskets: One set for each access door.
3. Fan Belts: One set for each air-handling unit fan.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: Five year(s) from date of Substantial Completion.
b. For Parts: One year from date of Substantial Completion.
c. For Labor: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. LG.

2. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
3. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
4. Trane; a business of American Standard companies.
5. YORK; a Johnson Controls company.

2.2 INDOOR UNITS (5 TONS OR LESS)

A. Concealed Evaporator-Fan Components:

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
2. Insulation: Faced, glass-fiber duct liner.
3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
4. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
5. Fan Motors:

    a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
    b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
    c. Wiring Terminations: Connect motor to chassis wiring with plug connection.

6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
7. Filters: Permanent, cleanable.
8. Condensate Drain Pans:

    a. Fabricated with one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

        1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
        2) Depth: A minimum of 2 inches deep.

    b. Single-wall, galvanized-steel sheet.
    c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.

        1) Minimum Connection Size: NPS 1.

    d. Pan-Top Surface Coating: Asphaltic waterproofing compound.
    e. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

B. Wall-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
3. Fan: Direct drive, centrifugal.

4. Fan Motors:

    a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
    b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
    c. Enclosure Type: Totally enclosed, fan cooled.
    d. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
    e. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
    f. Mount unit-mounted disconnect switches on exterior of unit.

5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
6. Filters: Permanent, cleanable.
7. Condensate Drain Pans:

    a. Fabricated with **one** percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

        1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
        2) Depth: A minimum of 1 inch deep.

    b. Single-wall, galvanized-steel sheet.
    c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.

        1) Minimum Connection Size: NPS 1.

    d. Pan-Top Surface Coating: Asphaltic waterproofing compound.

2.3 INDOOR UNITS (6 TONS OR MORE)

A. Concealed Evaporator-Fan Components:

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
2. Insulation: Faced, glass-fiber duct liner.
3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
4. Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch; leak tested to 300 psig underwater; with a two-position control valve.
5. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
6. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
7. Fan Motors:

a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
c. Three-phase, permanently lubricated, ball-bearing motors with built-in thermal-overload protection.
d. Wiring Terminations: Connect motor to chassis wiring with plug connection.

8. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
9. Filters: 1 inch thick, in fiberboard frames.
10. Condensate Drain Pans:

a. Fabricated with one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
2) Depth: A minimum of 2 inches deep.

b. Single-wall, galvanized-steel sheet.
c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.

1) Minimum Connection Size: NPS 1.

d. Pan-Top Surface Coating: Asphaltic waterproofing compound.
e. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

2.4 OUTDOOR UNITS (5 TONS OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

a. Compressor Type: Scroll.
b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
c. Refrigerant Charge: R-410A.
d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.

3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 45 deg F.
7. Mounting Base: Polyethylene.

2.5 OUTDOOR UNITS (6 TONS OR MORE)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

    a. Compressor Type: Scroll.
    b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
    c. Refrigerant Charge: R-410A.
    d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.

3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 45 deg F.
7. Mounting Base: Polyethylene.

2.6 ACCESSORIES

A. Control equipment and sequence of operation are specified in Section 230900 "Instrumentation and Control for HVAC" and Section 230993 "Sequence and Operations for HVAC Controls."

B. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.
2. 24-hour time control of system stop and start.
3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
4. Fan-speed selection including auto setting.

C. Automatic-reset timer to prevent rapid cycling of compressor.

D. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

E. Drain Hose: For condensate.

F. Additional Monitoring:

1. Monitor constant and variable motor loads.
2. Monitor variable-frequency-drive operation.
3. Monitor economizer cycle.
4. Monitor cooling load.
5. Monitor air distribution static pressure and ventilation air volumes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounted, compressor-condenser components on equipment supports specified in Section 077200 "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

D. Equipment Mounting:

1. Install ground-mounted, compressor-condenser components on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in other sections.
2. Install ground-mounted, compressor-condenser components on polyethylene mounting base.
3. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
4. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

C. Duct Connections: Duct installation requirements are specified in Section 233113 "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Section 233300 "Air Duct Accessories."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126

SECTION 23 81 29

VARIABLE REFRIGERANT FLOW HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes multi evaporator, direct expansion, air-cooled, variable capacity, split systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set(s) for each air-handling unit.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: 10 year(s) from date of Substantial Completion.
b. For Parts: 10 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. LG
2. Carrier
3. Daikin
4. Trane
5. York

B. General:

1. All components of the VRF System shall be by one manufacturer. The equipment shall include all required components required for a fully functional system.
2. The variable capacity, heat pump heat recovery air conditioning system shall consist of an outdoor unit, Branch Circuit Controller, multiple indoor units, and Direct Digital Controls. Each indoor unit or group of indoor units shall be capable of operating in any mode independently of other indoor units or groups. System shall be capable of changing mode (cooling to heating, heating to cooling) with no interruption to system operation. To ensure owner comfort, each indoor unit or group of indoor units shall be independently controlled and capable of changing mode automatically when zone temperature strays 1.8 degrees F from set point for ten minutes. The sum of connected capacity of all indoor air handlers shall range from 50% to 150% of outdoor rated capacity.

C. Air-Source Heat Recovery Condensing Unit
1. Description: Air-source module with cabinet, compressors, controller, heat exchangers, pipe connections, condensate drain pipe connections, and refrigerant pipe connections.
2. Sound: Each compressor module shall have a sound level no higher than 60 dBA.
3. Cabinet and Frame: Welded steel, braced for rigidity, and supporting compressors and other mechanical equipment and fittings.
    a. Doors and Access Panels: Galvanized steel with polyurethane gaskets, hinges, and concealed fastening devices.
    b. Finish of Exterior Surfaces: Baked-on, textured vinyl enamel; or powder coat.
    c. Base: Welded tubular steel, with adjustable legs and vibration isolation pads.
    d. Unit Frames: Condensing unit frame quantity shall match what is shown on drawings.
    e. Unit Capacity: Condensing unit tonnage shall match or exceed what is shown in schedule.
4. Oil Management
    a. The system shall be provided with a centrifugal oil separator designed to extract oil from the oil/refrigerant gas stream leaving the compressor and return the extracted oil to the compressor oil sump.
    b. The system shall have an oil level sensor in the compressor to provide direct oil level sensing.
    c. The system shall only initiate an oil return cycle if the oil level is too low.
5. Refrigeration System:
    a. Compressors: Inverter-driven, Hermetic scroll; internal motor overload protection, crankcase heater, manual-reset high-pressure switch, and phase failure/reversal.
    b. There shall be an accumulator with refrigerant level sensors and controls.
    c. The Compressor shall use a factory charge of Polyvinyl Ether (PVE) oil.
6. Air-Source Heat Exchanger Coil:
    a. Construction: The outdoor unit shall have a factory built coil comprised of aluminum fins mechanical bonded on copper tubing.
    b. Maximum pressure rating: Min. 551 psig
    c. Cabinet shall have coil guard.
    d. The unit shall have a 3 row heat exchanger.

D. Heat Recovery Unit
1. The VRF system shall have a heat recovery box as specified on the Mechanical Drawings to control refrigerant flow to each fan / refrigerant coil unit. Each fan / refrigerant coil unit shall operate independent of all other coil units on a compressor module.
2. Cabinet: Constructed of galvanized steel.
3. HR unit shall be designed to be piped in series or parallel.
4. Each port shall be capable of connecting from 1 to 8 indoor units to maximum nominal capacity of 54 MBH.
5. HR unit shall not require a condensate drain.

6. HR unit shall not exceed a net weight of 49 lbs.
7. Refrigerant Pipe Connections: Provide brazed connections.
8. Electrical Power Supply: 208 volts / 1 phase / 60 Hz.

E. Ceiling-Concealed Ducted Indoor Units
1. General: Ceiling-concealed ducted indoor fan coil design that mounts above the ceiling with a 2-position, field adjustable return and a fixed horizontal discharge supply and shall have a modulating linear expansion device. The unit shall contain all factory wiring, piping, electronic modulating linear expansion device, control circuit board, and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
2. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel. Ceiling-concealed, ducted air outlet system and ducted return air system. The cabinet panel shall have provisions for a field installed filtered outside air intake or filter mixing box accessory.
3. Insulation: Faced, glass-fiber duct liner.
4. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermalexpansion valve. Comply with ARI 206/110.
5. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor. External static pressure settings from 0.14 to 0.60 inch WG.
6. Fan Motors:
   a. Multitapped, multispeed with internal thermal protection and permanent lubrication. Minimum three (3) speeds, High, Mid, and Low plus the Auto-Fan function.
   b. Wiring Terminations: Connect motor to chassis wiring with plug connection.
7. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
8. Filters:
   a. General Requirements for Air Filtration Section:
      1) Comply with NFPA 90A.
      2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
      3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.
      4) Return filter box (rear or bottom placement) with high-efficiency filters. Internally insulated with faced, glass-fiber duct liner, 20-gauge galvanized steel construction with gasketed access doors. FBM series.
   b. Extended-Surface, Disposable Panel Filters:
      1) Factory-fabricated, dry, extended-surface type.
      2) Thickness: 2 inch. 3) Arrestance according to ASHRAE 52.1: 90.
      3) MERV according to ASHRAE 52.2: 13.
      4) Media: Fibrous material formed into deep-V-shaped pleats and held by self supporting wire grid.
      5) Media-Grid Frame: Nonflammable cardboard or Fire-retardant, 3/4-inch particleboard with gaskets.
      6) Mounting Frames: Welded, galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.

EXECUTION

2.2 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Equipment Mounting:

1. Install ground-mounted, compressor-condenser components on cast-in-place concrete equipment base(s).
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

2.3 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

C. Duct Connections: Duct installation requirements are specified in Section 233113 "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply **and return** ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Section 233300 "Air Duct Accessories."

2.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

2.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

2.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238129

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general administrative and procedural requirements for Division 26/27/28 that supplements the requirements specified in Division 01.

B. This section supplements all Sections of this Division and shall apply to all phases of Work specified, indicated in the Contract Documents, and as required to provide for a complete installation of electrical systems for the Project. Review all sections of the Specifications and drawings for related work and coordinate the work of this Section with all other Sections.

C. Should there be any direct conflict in the specifications and drawings the most stringent requirement shall govern.

D. The scope of work shall include but not be limited to the following:

1. Perform all incidental work required to provide a complete properly operating system. Provide the type and quantity of electrical materials and equipment necessary to complete Work and all systems in operation, tested and ready for use.
2. Provide all incidental items that belong to the Work described and which are required for complete systems.
3. Provide construction power and lighting.
4. Provide power for testing of equipment and systems through final acceptance tests.
5. Provide Electric power primary and secondary conduits and cables, low voltage (600 volts and below) cables and communication conduits and cables for data/telephone/CATV, underground utility structures including vaults (power & communications) and pull boxes from their respective locations where service for the designated system are provided. Where conduits or ducts are stubbed out and capped for future extension, concrete markers with utility pull boxes (17'x30" minimum) shall be provided at the finished grade to indicate the ends of the stubs.
6. Provide outlet, junction and pull boxes, plaster rings, plates, pull lines, and conduit for communication systems.
7. Provide and coordinate the installation of the following items per applicable codes and manufacturer's recommended performance criteria:

    a. Support and seismic restraint for all suspended or floor mounted equipment, raceways, etc.
    b. Vibration isolators and seismic anchorage for all floor mounted equipment.

8. Provide testing described in individual sections and Section 26 96 00.D
9. Provide assistance to district's team in collection of data for Pre-Functional and Functional tests.

E. Related work: Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable installation.

1. General and supplementary conditions: Drawings and general provisions of Contract and Division 01 of the Specifications, apply to all Division 26/27/28 Sections.
2. Earthwork: Include trenching, backfilling, boring and soil compaction as required for the installation of underground conduit, in-grade pull boxes, vaults etc.
3. Concrete work: Include forming, steel bar reinforcing, cast-in- place concrete, finishing and grouting as required for underground conduit encasement, pull box slabs, vaults, housekeeping pads, etc.
4. Moisture protection and smoke barrier penetrations: Include membrane clamps, sheet metal flashing, counter flashing, caulking and sealant as required for waterproofing of conduit penetrations and sealing penetrations in or through fire walls, floors, ceiling slabs and foundation

walls. All penetrations through vapor barriers at slabs on grade shall be taped and made vapor-tight.

5. Firestopping: Include firestopping and through-penetration protection system materials and accessories; firestopping tops of fire rated walls; and smoke sealing at joints between floor slabs and exterior walls.
6. Access panels and doors: fire rated as required, in the ceilings, walls and walls where necessary for access to electrical equipment, devices, junction boxes, pull boxes, conduit stubs, etc., located in the walls, floors or furred and T-Bar ceiling spaces. All access panel locations shall be coordinated with Architect.
7. Painting: Include surface preparation, priming and finish coating as required for electrical cabinets, exposed conduit, pull and junction boxes, etc. where indicated as field painted in this Division.
8. Miscellaneous metal work: Include fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracing of raceways, lighting fixtures, panel boards, distribution boards, motor control centers, switchboards, switchgear, transformers, etc.
9. General installation: Provide all sleeves, hangers, supports, inserts, anchors, bolts, etc., required for the installation of this work.

F. Construction Documents Drawings and Data

1. The drawings show the general arrangement of all piping, ductwork, conduit and equipment. Examine drawings and specifications very carefully and notify the District's Representative of any discrepancies so these can be rectified at an early date.
2. Should conditions necessitate any rearrangements, the Contractor shall prepare and submit drawings showing the changes before proceeding with the work. If such changes are approved, they shall become a part of this contract after their approval.
3. The drawings are diagrammatic and are a graphic representation of the Contract Requirements, produced according to the best available standards to an optimum scale. Dimensions of work as indicated on plans are not to be used as as-built dimensions. No measurements shall be scaled from the Drawings for use as a definite dimension for layout or fitting equipment and devices in place. The dimensions of all equipment and devices shall be based on the approved shop drawing submittals used on the project. The Contractor is solely responsible for dimensional control and coordination of the work to be installed.
4. The layout of equipment, as shown on the plans, shall be verified and exact location determined by dimensions of equipment accepted for installation. Consult the Architectural, Structural drawings and other contract documents for all dimensions, locations of partitions, sizes of structural members, foundations, etc.
5. The Contractor shall be responsible for the coordination of the electrical installation with ducts, pipes, fire sprinklers, raceways, cable trays, structural members, ceiling support and all other systems and other applicable trades within the project.

G. Minor Deviations from Construction Documents

1. Where the equipment furnished requires redesign of layouts, connections, or configuration, and such deviations are acceptable to the District’s Representative and Architect, the contractor shall provide dimensioned engineered layouts for review and approval.
2. Certified Reports and Calculations: Where the equipment size, dimensions and weight are different than indicated on drawings, submit certified report including seismic calculations for anchorage or support to the Engineer of Record for review/approval prior to submitting to the AHJ.

    a. Submit structural calculations and shop drawings for electrical equipment support.
    b. Submit anchorage calculations for floor and wall mounted electrical equipment so that it shall remain secured and attached to the mounting surface after experiencing forces in conformance with all the requirements stated in the local and state Building Codes. Specify proof loads for drilled-in anchors, if used.
    c. Submit detailed information regarding the forces exerted by the restraints, anchorages, and other points of attachment to structure.
    d. All Calculations shall be prepared, stamped and signed by a professional Structural Engineer registered in the state.

1.2 REFERENCES

A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Such codes or standards shall be considered a part of this Specification as though fully repeated herein.

B. When codes, standards, regulations, etc. allow work of lesser quality or extent than is specified under this Division, nothing in said codes shall be construed or inferred authority for reducing the quality, requirements or extent of the Drawings and Specifications. The contract documents address the minimum requirements for construction.

C. Before bidding, be familiar with rulings of the building and inspection departments and comply with such requirement. Rulings and interpretations of authorities shall be considered as part of the regulations.

D. It is not the intent of Drawings and Specifications to repeat requirements of codes except where necessary for completeness or clarity. Nothing in the Drawings or Specifications is to be construed to permit work not conforming to the applicable codes and regulations adopted by the Division of State Architect. Should there be any direct conflict between Contract Documents and applicable codes and regulations the codes and regulations shall govern.

E. Work shall be performed in accordance with all applicable requirements of the listed edition of all governing 2019 California codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:

F. Standards: Equipment and materials specified under this Division shall conform to the following standards where applicable:

1. ACI - American Concrete Institute.
2. AEIC - Association of Edison Illuminating Companies
3. AISI - American Iron and Steel Institute
4. ANSI - American National Standards Institute
5. ASTM - American Society for Testing Materials
6. CBM - Certified Ballast Manufacturers
7. ETL - Electrical Testing Laboratories
8. FAA - Federal Aviation Administration
9. FCC - Federal Communications Commission
10. FM - Factory Mutual
11. FS - Federal Specification
12. ICEA - Insulated Cable Engineers Association
13. IEEE - Institute of Electrical and Electronics Engineers, Inc
14. IESNA - Illuminating Engineering Society of North America
15. ISO - International Standardization Organization
16. NEMA - National Electrical Manufacturer's Association
17. NETA - National Electrical Testing Association
18. NFPA - National Fire Protection Association
19. OSHA - Occupational Safety and Health Act
20. UL - Underwriters Laboratories

1.3 SUBMITTALS

A. Submittals for each section shall conform to the general guidelines and procedures of Division 01 and this section.

B. Submittal Schedule:

1. Provide a submittal schedule in accordance with Division 01 requirements.
2. The submittal schedule shall be a complete list of all submittals to be made with projected dates of all submittals.
3. The submittal schedule shall assume at least one “Revise and Resubmit” cycle. Delays to schedule associated with submittals’ “Revise and Resubmit” designation are ineligible for change orders, as timely and correct work is a requirement of this contract.

C. General Organization of Submittals:

1. Submittals shall be neatly bound in an 8-1/2" x 11" folder or binder for each Specification Section with a table of contents listing materials by Section and paragraph number.
2. Submittals shall consist of detailed shop drawings, specifications, block wiring diagrams, "catalog cuts" and data sheets containing physical and dimensional information, performance data, electrical characteristics, materials used in fabrication, and material finish. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories which are included and those which are excluded.
3. Organize submittals in the same sequence as they appear in specification sections, articles or paragraphs.
4. Each submission shall be made under the Specification Section Number it has been specified under. Submittals including equipment specified under a different specification section will be rejected and returned without review. Each section is required to be tracked separately for status designation, even if multiple sections are physically collated into a single binder.
5. Identify each item with each submittal by reference to Specification Section paragraph in which the item is specified or Drawing and Detail number. Annotate the submittal sheets with the equipment identification numbers appearing on the equipment schedule.
6. Include all information requested by the Specification Section in a single submittal. With the exception of shop drawings, incomplete submittals or phased submittals under the same specification section are not acceptable and will be returned without review.
7. Submit pertinent catalog and performance data sheets only. Annotate pages to clearly identify which specific product is submitted and for what tag number or application. Contractors shall not submit entire catalogs.
8. Submission shall be made in the form of a tab-indexed brochure. Index sheets shall be required for all material and equipment.
9. Each submittal shall be accompanied by a cover letter or shall bear a stamp stating that the submittal has been thoroughly reviewed by the Contractor and is in full compliance with the requirements of the Contract Documents. Cover letters shall list in full the items and data submitted. Failure to comply with this requirement shall constitute grounds for rejection of data.

D. Equipment Submittals:

1. Identify each item by manufacturer, brand, trade name, number, size, rating, or whatever other data is necessary to properly identify and check materials and equipment. Words "as specified" are not sufficient identification.
2. Mark the exact equipment item and data on each sheet. Where multiple product model types are listed on a single sheet, the contractor shall clearly indicate which specific items are submitted. If different model numbers of a single product line are submitted for different uses, this should be clearly annotated, identifying each individual use cross-referenced by the requirement it intends to fulfill. Submittals without annotation will be rejected and returned without review.
3. Submittal literature, drawings and wiring diagrams shall be specifically applicable to this project and shall not contain extraneous material or optional choices. Clearly mark literature to indicate the proposed item and its relevant features or options. Submittals shall include all those items listed in each individual Section.
4. As part of the equipment submittals, the manufacturer shall submit documentation to indicate that the entire assembly is suitable and certified to meet all applicable seismic requirements. In addition, the manufacturer shall recommend the method of anchoring the equipment to the mounting surface, including the assembly dimensions, weights and approximate centers of gravity.

E. Shop Drawings:

1. Provide shop drawings for all systems as required per individual Division 01 & 26 specification sections, drawings or Construction Documents.
2. All equipment shall be shown to scale and shall match the required dimensions from the equipment submittals. All equipment access clearances shall be marked explicitly on the Shop Drawings with manufacturer and code required distances dimensioned and annotated as such.
3. The drawings shall be minimum 1/4" = 1'-0" scale.

4. Independent structural support and structural pad drawings shall be submitted for review by Structural Engineer.
5. All equipment shall be labeled to match the drawings.
6. The Contractor shall assure that each trade has coordinated work with other trades, prior to submittal. Division 26 shop drawings shall be issued after the coordination drawings are signed off by all other trades. Any conflicts that occur with other trades shall be brought to the attention of the District's Representative prior to issuance of the shop drawings.
7. Provide detailed drawings of all electrical equipment rooms, yards and utility areas. Revised electrical equipment layouts must be reviewed and approved prior to release of order for equipment and prior to installation.

F. Substitutions:

1. All requests for substitutions shall conform to the general requirements and procedure outlined in Division 01.
2. Where items are noted as "or equal," a product of equal design, construction and performance will be considered. Contractor must submit all pertinent test data, catalog cuts and product information required substantiating that the product is in fact equal to that specified. Only one substitution will be considered for each product specified.
3. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of quality, utility and appearance. Materials, processes or equipment, which, in the opinion of the District's Representative, is equal in quality, utility and appearance, will be approved as substitutions to that specified.
4. Whenever any material, process or equipment is specified in accordance with a Federal specification, ASTM standard, ANSI specification, UL listing or other association standard, the Contractor shall present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. When requested by the District's Representative, support test data to substantiate compliance shall be submitted by the Contractor at no additional cost.
5. Substitutions shall be equal, in the opinion of the District's Representative, where **noted as district standards no substitutions are permitted to the specified product.** The burden of proof of such shall rest with the Contractor. When the District's Representative, in writing, accepts a substitution, it is with the understanding that the Contractor guaranteed the substituted article or material to be equal to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the work, or from any provisions of the Specifications.
6. The Contractor shall be responsible for all expenses in connection with the substitution materials, processes and equipment, including the effect of his substitution on him, his subcontractor's or other Contractor's work. No substitution of material, processes or equipment shall be permitted without written authorization of the District's Representative. Any assumptions on the acceptability of a proposed substitution prior to acceptance by the District's Representative are at the sole risk of the Contractor.

G. Resubmittals:

1. All re-submittals shall include a cover letter that lists the action taken and revisions made to every drawing and equipment data sheet in response to Submittal Review Comments. Re-submittal packages will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the re-submittal package.
2. Resubmittals shall be complete and shall be explicitly annotated to note all changes. Contractor shall not just include specific responses to review comments but shall show how the resubmittal data has been corrected and how all consequences of the change have been accommodated.
3. Changes made in the resubmittal which are not directly a response to an earlier review comment shall be clearly identified on the letter of transmittal provided with the re-submittal and annotated within the body of the submittal. The reason for the change shall be included.
4. Non-compliant items which were not noticed in an earlier submittal but are noticed in a resubmittal shall be noted as non-compliant and the resubmittal tagged for corrective action. The fact that the District's Representative may have overlooked the defect shall not

constitute total or partial acceptance of it. The contractor remains responsible for delivering an installation that meets the design intent. All corrective action shall be performed at no additional cost or delay to the project.

1.4 QUALITY ASSURANCE

A. Nothing in these plans or specifications is to be construed to permit work not conforming to the prevailing codes and regulations. Should there be any direct conflict between any referenced standard and the governing code, the mandatory code language shall govern to set only the minimum requirements and the most stringent requirement shall govern.

B. Factory and Field Testing

1. See each Section for the required testing and procedures.
2. Test reports shall include:

   a. Description of equipment tested
   b. Description of test procedures
   c. Test results
   d. Names and signatures of witnesses of tests.

3. Notify the District's Representative 14 days in advance of when tests will be performed.

C. Electrical Acceptance Testing

1. Contractor shall engage the services of a qualified third party testing agency for the purpose of performing inspections and tests of installed Work as herein specified and specified in other Sections of Division 26 of these Specifications.
2. The testing agency shall provide all material, equipment, labor and technical supervision to perform such tests and inspections.
3. All tests shall be performed in compliance with the recommendations and requirements of the NETA and applicable codes and standards.
4. Upon completion of the tests and inspections noted in these specifications, a label shall be attached to all tested devices and equipment. These labels shall indicate date tested and the testing company responsible.
5. The tests and inspections shall determine suitability for continued reliable operation.
6. All tests shall be conducted in the presence of District's Representative and Inspector of Record (IOR).
7. Test reports: All test forms, results and reports shall be typed in their final form.

D. Materials and Standards

1. The label of listing by UL shall appear on all materials and equipment for which standards have been established by the agency.
2. Where codes listed in Division 01, establish label or approval requirements, furnish all materials and equipment with either the required labels affixed or the necessary written approval.
3. All base material shall be per ASTM and/or ANSI standards.

E. Materials and Workmanship

1. All materials shall be new, meet the requirements of the contract document and be identifiable as being specified or substitute products.
2. Materials that do not conform to the requirements of the contract documents, are not equal to approved samples or are unsatisfactory or unsuited to the purpose for which they are intended, will be rejected and shall not be installed.
3. All equipment shall be installed in accordance with the recommendations of the manufacturers.
4. Work performed under this Division shall be installed by craftsmen skilled in the trade involved, and apprentices as indicated in General Conditions.
5. Provide all control equipment for electrically operated equipment except when equipment is furnished with control equipment.
6. Provide all electrical work required for the service and connection of electrically operated and controlled equipment specified in other Divisions of the Specification.

7. All electrical power, signal, alarm, notification and communication systems shall be complete, tested and ready for use.
8. Defective work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or other cause shall be removed within ten (10) days after written notice is given by the District's Representative, and the work shall be re-executed by the Contractor. The fact that the District's Representative may have previously overlooked such defective work shall not constitute total or partial acceptance of it.
9. The Contractor recognizes that the design is based upon the equipment and material specified by name or construction and the Contractor accepts full responsibility for assuring that the quality, utility and performance of a substitution equals or exceeds that of the specified item.
10. In no case shall a Bidder base his bid on a class of material or workmanship less than that required by the contract documents nor the governing codes and ordinances.

F. Checking and Testing Equipment by Contractors and Manufacturer's Representative:

1. All equipment shall be installed per the manufacturer's instructions. During construction contractor shall request supervisory assistance from equipment manufacturer's representatives so the equipment will be correctly installed. After installation, request the District's Representative to observe and see the equipment is in proper working order.
2. Manufacturer's representative shall review the overall system design relative to the proper application of his equipment in the particular system. He shall note conduit, wiring, control, location, and other relevant relationships, and furnish appurtenances necessary for satisfactory operation.
3. Before equipment start up, the manufacturer's representative shall submit to the District's Representative, a signed statement certifying to their inspection and noting that the equipment is properly installed and ready for operation.

1.5 PROJECT RECORD DOCUMENTS

A. Record documents shall conform to the Closeout Procedures of Division 01 and this section.

B. Keep up-to-date during the progress of the job through, one set of drawings indicating the Record installation. In addition to changes made during course of Work, show following by dimensions from readily obtained base line reference points:

1. Show exact layout of the equipment, pads, overhead or underground conduits, riser conduits and bus ducts in electrical rooms.
2. Show exact layout of the equipment, pads, overhead or underground conduits in outdoor equipment yards.
3. Show exact layout of the equipment, pads, feeder conduits and bus ducts in mechanical and utility rooms.
4. Show exact layout of the equipment, pads, and feeder conduits on the roof or outdoor areas.

C. Underground utility services, both inside and outside of buildings, shall be dimensioned from permanent structures, bench marks or property lines. Utility services outside of buildings shall also show depth of burial with reference to the finished ground floor elevation.

D. This set of drawings shall be kept on the project site at all times and shall be available for inspection by District’s Representative or Construction Manager.

E. Submit completed Drawings to District’s Representative for approval prior to authorization for final payment.

F. Record drawings shall be certified as to their correctness by the signature of the Contractor and shall be stamped or otherwise identified as record drawings.

G. At the completion of the project the Contractor shall submit record as-built drawings as specified in Division 01 and their electronic CAD files. Drawings shall incorporate all the District’s and Architect’s comments and represent completed as-built conditions.

1.6 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Instructions and Manuals: In accordance with requirements of Division 01 and as follows:

1. Prior to project closeout, furnish to the District's Representative hard back 3-ring binders containing all bulletins, operation and maintenance instructions, parts' lists, service telephone numbers and other pertinent information as noted in each Section for equipment furnished under Division 26. Binders shall be indexed into Division Sections and labeled for easy reference. Bulletins containing more information than the equipment concerned shall be properly stripped and assembled.
2. O&M manuals shall be in both hard copy format and electronic format. Electronic files must have searchable text for ease in locating specific information, i.e. no scanning of paper documents.
3. O&M's shall include the copy of approved submittal information so that the specific details and applications of each device for this project are available.
4. One month prior to request for final inspection, submit Operating and Maintenance manuals or as stated in Division 01.
5. Manuals shall be prepared to include the following:

    a. Section 1: A comprehensive table of contents and guide to the manuals contents and layout. This section shall enable the reader to comprehend the scope and purpose of the document and to identify readily where specific information can be obtained.
    b. Section 2: Contractual and Legal records including:
    c. Name and Address of the installation

        1) Details of IOR, District, Architect & Engineer's approvals
        2) Name and Contact details of the Design Team and Installing Contractors and associated sub- contractors
        3) Dates for Start of Installation, Substantial Completion, and Expiry of Warrantee period
        4) Copies of maintenance service contracts and contact details for local service company
        5) Copies of warrantees and bonds

    d. Subsequent Sections:

        1) Startup and Shutdown Procedures: Provide a step-by-step write-up of all major equipment. When manufacturer's printed start-up, troubleshooting and shut-down procedures are available, they shall be incorporated into the operating manual for reference.
        2) Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.
        3) Service Instructions: Provide the following information for all pieces of equipment:

            a) Recommended spare parts, including catalog number and the name, manufacturer's name and contact information, address and telephone number of local suppliers of factory representative.
            b) Maintenance instructions and recommended service maintenance schedule for all equipment. Provide sample maintenance record forms for each equipment type.
            c) Data sheets to show complete internal wiring, mechanical and electrical ratings and characteristics, catalog data on component parts whether furnished by equipment manufacturer or others, names, addresses and telephone numbers of source of supply for parts subject to wear or electrical failure, and description of operating, test, adjustment, and maintenance procedures.
            d) Where data sheets included in manual cover equipment, options, or other features not part of equipment actually furnished, line out these references or otherwise clearly mark so remaining text, diagrams, drawings, schedules, and similar information shall apply specifically to equipment furnished.
            e) Final submittals for equipment shall have final corrections included in the prints used for the manual.

1.7 TEMPORARY FACILITIES

A. Temporary Light and Power: Provided under requirements of Division 01.

B. All temporary facilities shall be removed at completion of project, with permanent facilities returned to proper working order.

1.8 REGULATIONS, CODES, PERMITS AND FEES

A. Conform to all rules, regulations, laws, and ordinances governing the area in which this construction occurs.

B. Obtain the required permits from the local authorities for this work and pay for all fees required by the City, County, State and Federal authorities for permits, inspections and review, including special agency construction and operating permits. Make corrections in the work as required by the District's Representative or Inspector to pass local regulations.

C. Provide local authorities with all notices relating to this Division.

D. Provide District, District's Representative and local Inspectors access to work at all times.

E. Contractor shall be responsible for all law violations caused by the work under this Division. Notify the District's Representative in writing when a discrepancy occurs between code requirements and work shown on drawings and resolve matter before proceeding with work.

F. Make application and pay for all certificates of inspection, taxes and permits required by Local, State or Federal Government agencies, public utilities, or other authorities having lawful jurisdiction. Deliver to the District's Representative any and all certificates of inspections, permits, and approvals that may be required by such authorities.

1.9 COORDINATION

A. Coordination activities shall conform to the Administrative Requirements of Division 01 and this section.

B. Cooperate with all other Divisions performing work on this project as necessary to achieve a complete neatly fitted installation for each condition. Consult the Drawings and Specifications to determine the nature and extent of work specified in other Divisions that adjoins, shares space with, or attaches to the work of this Division. Confer with other Divisions at the site to coordinate this work with theirs in view of job conditions to the end that interferences may be eliminated and that maximum headroom and clearance may be obtained. In the event that interferences develop, the District's Representative's decision will be final as to which Division shall relocate its work, and no additional compensation will be allowed for the moving of piping, ductwork, conduit or equipment to clear such interferences.

C. Identify congested conditions. Congested areas typically include ductwork, piping, electrical work, ceiling work, etc. Include all mechanical and utility rooms and congested areas in corridors, tunnels and similar spaces. Shop Drawings for Work in "tight" areas shall clearly indicate the solutions to space problems in coordination with Work in other Sections. Identification of space problems without solutions is not acceptable. Solutions to problems may include relocation or rerouting of existing equipment, pull box, conduit, piping, and etc. to allow installation of new work.

D. Arrange for raceway spaces, chases, slots, and openings in building structure during progress of construction, to allow for electrical installations.

E. Coordinate installation of required supporting devices in form work and set sleeves in poured-in-place concrete and other structural components as they are constructed.

F. Coordinate requirements for access panels and doors for electrical items requiring access that are concealed behind finished surfaces.

G. Cutting and Patching

1. The Contractor shall do all cutting of building materials, conduit, etc., as required for the installation of work.
2. No structural members shall be cut without the prior approval of the District's Representative. To gain approval to cut concrete, Ferro scan the affected area and submit scan results to Structural Engineer for review. Submit to District’s Representative, drawings and details for the support of structure around the opening. If the standard structural details are

to be used, then submit a plan that cross-references all penetrations against detail numbers for review. Otherwise, submit drawings, design, and calculations stamped by a Registered Professional Structural Engineer in the state of California. Any cutting and remedial support shall be done in a manner satisfactory to the District's Representative.

3. Patching of building structure, walls, floors, etc. during normal work progress shall be consistent with the Requirements of Division 01.
4. All patching of or repair of damage to completed work in place shall be done to meet with the approval of the District's Representative.
5. All cutting shall be performed with machine saw. Holes for pipes in concrete walls or floors shall be drilled with core drilling equipment.
6. Work in place that is subsequently cut is seen as evidence of the contractor's lack of field coordination during the shop drawing production phase. Because field coordination is a requirement of the contract, the contractor must bear all costs of cutting, patching and repair for corrective work.

1.10 LOCATION AND ROUTING

A. The Drawings are for reference only and indicate diagrammatically the desired location or arrangement of equipment, devices, lights, outlets, pull boxes, vaults/manholes, raceways, and etc. are to be followed as closely as possible. Judgment must be exercised in executing the Work so as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference with structural and existing conditions. Exact locations necessary to secure proper conditions and results shall be determined at Project Site and shall be approved by the District's Representative.

B. Verify dimensions, correct location and electrical requirements of all equipment specified in other Divisions before proceeding with the roughing-in of connection.

C. Locations shown on architectural drawings or on wall elevations shall take precedence over electrical drawing locations.

D. Access to Equipment: Locate all electrical equipment and pull boxes to provide easy access for operation, repair, and maintenance. All code required clearances shall be maintained for accessing the equipment and its disconnecting means.

E. Locations of Openings: Locate all chases, shafts and openings required for the installation of the electrical Work during framing of the structure. Do any cutting and patching required due to improperly located or omitted openings with the approval of the district's Representative, who must also approve any additional changes resulting from relocation or omission of openings. Cutting or drilling in any structural member is prohibited without prior written approval of the District's Representative.

1.11 SEISMIC PROTECTION

A. Electrical equipment installation in any Seismic Design Category shall be protected from earthquakes per all applicable local and state Building Codes.

1. Protection criteria for equipment shall be a Horizontal Force Factor as prescribed by the CBC multiplied by the equipment weight considered passing through the equipment center of gravity in any horizontal direction.
2. Equipment shall be protected from earthquakes by rigid structurally sound attachment to the load supporting structure unless vibration isolators are required to eliminate the unacceptable structure transmitted noise and/or vibration.
3. The force factor and anchorage shall be determined by calculations performed by a professional Structural engineer registered in the state whether the isolators are present or not and shall be verified by the seismic restraint vendor.
4. Equipment requiring vibration isolators shall be furnished with protected spring isolators or separate seismic restraints as required. Seismic snubbers and protected spring isolators shall be seismically rated in three principal axes by independent testing laboratory or analysis by an independent professional Structural engineer.

B. Contractor shall be responsible to provide seismic restraint systems and supporting concrete pads for the entire project.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver equipment, fixtures, devices and conduits with factory-fabricated containers and protective means. Maintain containers and protective means through shipping, storage, and handling to prevent damage and to prevent exposure to dirt, debris, and moisture.

1. Perform all handling and shipping in accordance with manufacturer's instructions.
2. Do not deliver equipment/materials to the jobsite before they are ready for installation, unless properly secured and safe storage areas are provided.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect equipment from dirt, water, construction debris, and traffic.

C. Handling: Handle in accordance with manufacturer’s written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed and shall be replaced with new units.

1.13 DEFENITIONS

A. “Approved Equal” means any equipment or material which in the opinion of the architect, is equal in quality, durability, appearance, strength, design and performance to the equipment or material specified and will function adequately in accordance with the general design.

B. “Authority Having Jurisdiction” or “AHJ” shall mean the building department, fire department, Inspector of Record (IOR), Division of State Architect (DSA) or other authority having legal jurisdiction relevant to the specific work being described in the City or State where the project is located.

C. “Concealed, Interior Installations” Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in wall conduits.

D. “Concealed, Exterior Installations” Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

E. "Connect": Shall mean make final electrical connections for a complete operating piece of equipment.

F. “Contract Documents” or “Documents” shall mean the latest version of all drawings and specifications prepared by the Architect, Engineers and Consultants.

G. “Equal”: Shall be of the same quality, appearance and utility to that specified, as determined by the District’s Representative. Contractor bears the burden of proof of equality.

H. “Exposed, Exterior Installations” Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include equipment yards or rooftop locations.

I. “Exposed, Interior Installations” Exposed to view indoors. Examples include finished occupied spaces and electrical equipment rooms.

J. “Finished Spaces” Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

K. “Furnish” means purchase, store and deliver the specified material, equipment or other items to project site or the person and party indicated.

L. "Install": means to physically install the equipment or other items in-place and in readiness for regular operation.

M. “Provide” means to supply, erect, install and connect up completely, in readiness for regular operation, the particular work referred to.

1.14 TRAINING

A. Furnish a period of sixteen (16) hours (4 – 4-hour sessions) for the necessary training programs and instructions to District's personnel, unless indicated otherwise in individual specification sections.

1.15 WARRANTY

A. Conform to the requirements of "Warranties" as stated in Division 01 specifications.

B. Unless otherwise noted within a section, under special warranty each complete system shall be warranted by the Contractor for the period referenced in Division 01. Each system shall be free of defects of materials and workmanship and shall perform satisfactorily under all conditions of load or service.

1. The warranties shall provide that all additional controls, protective devices or equipment provided as necessary to make the system or equipment operate satisfactorily and any faulty materials or workmanship shall be replaced or repaired.
2. On failure of the warrantor to do the above after written notice from District, the District shall have the Work done at the cost of the warrantor.

C. Provide new materials, equipment, apparatus and labor to replace that determined by District to be defective or faulty within the warranty period.

D. Unless otherwise noted, warranties shall commence upon the District's final acceptance of the project.

1.16 COMMISSIONING

A. Commissioning requires the participation of Division 26 work to ensure that all systems are operating in a manner consistent with the Design Intent. The general commissioning requirements and coordination are detailed in Division 01 and Division 26. This Division shall be familiar with all parts of Division 01 and Division 26 and the commissioning plan issued by the Commissioning Authority and shall execute all commissioning responsibilities assigned to them in the Contract Documents.

B. The contractor is responsible for assisting the district throughout the entire commissioning process.

C. The work is not complete until the commissioning and District's Representative have signed off on the commissioned systems.

PART 2 - PRODUCTS

2.1 GENERAL

A. In other Part 2 articles where subparagraph titles below introduce lists, the following

requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified. A prior written approval is required for all items including any substitutions allowed for use on the project.
2. Whenever possible, all materials and equipment used in the installation of the work shall be of the same brand or manufacturer for each class of material or equipment.

B. Construction of all electrical equipment such as unit substation, switchboard, motor control center, generator, panel board, transformer and similar equipment shall meet local seismic code requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to bidding visit the site and determine all existing conditions affecting work of this Division. The Contractor shall thoroughly review the locale, working conditions, conflicting utilities and the conditions in which the electrical work will take place. Verify all existing conditions in the field. No allowances will be made subsequently for any costs that may be incurred because of any error or omission due to failure to examine the site and to notify the District's Representative of any discrepancies between Drawings and Specifications and actual site conditions.

B. The location and elevation of the utilities, existing ductwork, piping, conduit, or equipment are that which can be determined from available information and its accuracy cannot be guaranteed. Exact location and elevation of these items shall be verified by the Contractor prior to excavation, demolition, or installation of any portion of the work indicated. Exercise special care when excavating at or near the general location of underground utilities to avoid damage to the utility services, as well as to ensure worker safety.

C. Any connections to or relocation of any existing utility line requiring temporary discontinuance of utility services which are in active use shall be scheduled and coordinated with the utility company and the District's Representative. In no case shall the services be left disconnected at the end of a working day or weekend unless authorized by representatives of the utility company and the District. Any existing utility service damaged shall be repaired to the satisfaction of the District's Representative.

D. Examine all Drawings and Specifications to familiarize with the type of construction to be used, and the nature and extent of work of other trades.

E. Observe the conditions under which deliveries of materials and equipment shall be made and under which such materials and equipment can be stored and shall include adequate provision in the bid proposal.

3.2 FIELD VERIFICATION

A. All dimensions, locations of equipment and connections to utilities or pre-existing equipment shall be verified in field prior to construction and installation.

B. All roughing in construction dimensions shall be made from architectural plans where discrepancies may exist.

C. Architectural plans will hold precedence over electrical plans as to location of partitions, devices and equipment locations.

D. Measurements in existing buildings shall take precedence over all other plans with regards to identifying location of existing installations.

3.3 PROVISIONS FOR FUTURE INSTALLATIONS

A. At the start of the project, meet with the District's Representative to obtain information regarding allowable sleeve or penetration spacing and size. Provide all sleeves, inserts, and openings necessary for the installation of the Electrical and communications Work.

B. Where any Electrical work cannot be installed as the work progresses, the Contractor shall provide and arrange for the pads, sleeves, inserts, and any provisions as necessary to permit installation of the omitted work during later phases of construction. This field coordination work shall be completed prior to structural shop drawings and shall follow the principles set forth in the meeting referenced above. Arrange for and lay out any chases, holes, or other openings that must be provided in masonry, concrete or other work.

C. The Contractor shall be responsible for being aware of the nature and arrangement of the materials and construction to which the work attaches or passes through, and shall propose support and penetration details that are consistent with maintaining the integrity and performance of the construction such as, but not limited to, fire- resistive construction, acoustically rated construction, vibration isolated construction, water tight construction, fire proofed construction, and isolated construction.

D. This work shall be incorporated into the initial shop drawing review of the construction (wall, floor, roof, etc.) that is affected so that the District's Representative may review the impact of the holes.

E. The contractor shall bear the cost of time and materials for the District's Representative to re-analyze the construction if the original spacing principles are not adhered to, for whatever reason.

F. Once the structural shop drawings are returned with no exception taken, the contractor shall bear the cost of time and materials for the District's Representative to review the appropriateness of cutting or drilled holes in planned or existing construction.

3.4 INSTALLATION

A. Install electrical equipment as specified in individual specification sections, and in accordance with the manufacturer's instructions, code requirements, and required access clearances.

B. No material, device or equipment shall be shipped to site unless shop drawings have been approved for such, prior to shipment.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install raceways, boxes and lights to allow maximum possible headroom where specific mounting heights are not indicated.

E. Rough-in locations for fixtures and equipment shall be determined from the unit itself or from the approved shop drawings.

F. Arrange for necessary openings to allow for admittance of equipment. Where equipment cannot be installed as structure is being erected, provide and arrange for building-in of boxes, sleeves, or other devices to allow later installation.

G. Install equipment to permit easy access for normal maintenance.

1. Maintain easy access to switches, motors, drives, pull boxes, receptacles, etc.
2. Notify the District's Representative in writing of relocation items which interfere with access.

H. Suspended raceways and equipment shall be installed in accordance with the Applicable local, state and national Building Codes.

I. Hangers, Inserts, Supports and bases:

1. Provide all necessary anchoring devices and supports as required and stated elsewhere:

   a. Use structural supports suitable for equipment, or as indicated.
   b. Check loadings and dimensions of equipment with shop drawings.
   c. Do not cut or weld to building structural members.

2. Provide required structural members, hangers, supports and inserts to keep cable trays and conduits in proper alignment and prevent transmission of injurious thrusts and vibrations. Where supported from concrete construction, do not weaken concrete or post-tension strands or penetrate waterproofing. Hangers and supports shall be finally adjusted in vertical and horizontal direction under operating conditions.
3. Metal deck roof systems shall not be used for the support of hangers, inserts, etc.
4. Provide all metal bases and supports, not part of the building structure as required. Materials and equipment furnished or provided under this Division shall be as described for similar work under other Divisions.
5. Coordinate the location of inserts with Division 03 prior to pouring of concrete.

3.5 PROTECTION AND STORAGE

A. All stock-piled material shall be placed on pallets and protected from weather and from entry of foreign material and construction dust by plastic. All stored materials and equipment shall be carefully inspected and cleaned prior to installation and replaced with new material or equipment if found to be damaged, corroded, etc.

B. Equipment which is observed to be exposed to the weather, dirt or construction debris can be interpreted by the District's Representative as defective equipment under this clause.

3.6 TOOLS AND EQUIPMENT

A. Furnish all tools and equipment necessary for the proper installation, protection and upkeep of the work.

3.7 EXCAVATION, TRENCHING AND BACKFILL

A. Do all excavation, trenching and backfill required to install the work in this Division.

B. Coordinate trenching and backfill required for the installation of this Division. Repair or replace all roadway, sidewalk, pavements, parking lots, Asphalt & Concrete surfaces, gutters, curbs and other work incidental thereto. Dispose of excavation material per other Divisions of specifications.

C. Provide barricades, signs, lanterns, shoring, sheeting and pumping as part of Work in this Division as required to insure safe conditions. Comply with OSHA requirements.

D. Shore all trenches and excavations as necessary to maintain the banks of excavations and to prevent any sloughing, caving-in or damage of any kind.

E. Trenching: Subject to the requirements of the civil engineer, dig trenches straight, true to line and grade with sides and bottoms smoothed of any rock points. All trenches shall be sloping away from the building. All trenching required for utility company shall comply with individual utility company requirements.

F. Excavation: All excavations shall be inspected by the District's Representative, IOR and approved before placing of any conduit or pull box. Bury conduits outside the building to a depth of not less than 24 inches below finish grade unless otherwise noted and comply with CE 305.

G. Backfilling: Do not backfill until final inspection and approval for the conduit installation by the District's Representative. Any imported backfill material required shall be approved by the Architect responsible for certification of compaction.

3.8 DEMOLITION

A. General:

1. The work involves demolition of existing conduit, conductors and equipment.
2. Refer to contract documents for any demolition, relocation, removal or rerouting of existing conduits and equipment.
3. All demolished or Contractor removed materials become the property of the Contractor, unless otherwise indicated. Contractor shall be responsible for removing such materials from the job site.

B. Equipment: All the existing equipment to be removed from site & building shall be disassembled or cut into pieces to allow removal through available existing openings.

C. Conduits (feeder and branch): Conduits shall be capped, and wires/cables removed for all abandoned installations.

3.9 PROTECTION AND CLEANING

A. Protection: Fully protect all finished parts of the materials and equipment against physical damage from whatever cause during the progress of the work and until completion.

B. During construction, cap all conduits so as to prevent the entrance of sand and dirt.

C. Clean premises of all excess construction material and debris caused by work, in accordance with Division 01.

D. Surfaces shall be left clean, debris shall be removed, and equipment shall be furnished in prime coat finish unless otherwise specified.

E. Clean exterior of conduit and equipment exposed in complete structure. Remove rust, paint overspray, fireproofing overspray, plaster and dirt by wire brushing; remove grease, oil and similar materials by wiping with clean rags and suitable solvents.

F. Equipment, devices and Other Items with Factory Finish: Remove grease, oil, paint overspray, fireproofing overspray, gypsum board muds platters and leave surfaces clean.

3.10 CONCRETE

A. General: All concrete required shall be provided as specified in Division 03, CONCRETE.

B. Concrete Pads:

1. Provide concrete pads for installation of all floor mounted equipment whether indicated or not on drawings. The concrete pads shall be sized to carry the weight of the equipment and allow the proper installation of anchorage bolts and any vibration isolation devices.
2. Construct concrete pads of dimensions indicated, but not less than 3 inches high (where required, deeper pads shall be used to meet the equipment anchorage requirements) and extending 3 inches beyond edge of the supported equipment or as required.
3. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
4. Anchor equipment to concrete pad according to equipment manufacturer's written instructions and according to applicable seismic codes.
5. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
6. Provide provisions for water drainage by providing slope at the concrete pad.

C. Use 2500-psi, 28-day compressive-strength concrete and reinforcement.

3.11 SEISMIC RESTRAINTS

A. Provide seismic restraints and supports for equipment and work as specified in the Specification Section 26 05 48, this and other specification sections, and as shown on drawings.

1. Seismic restraints and supports shall be installed directly after installation of any work requiring them, to avoid concealment or difficulty of access.
2. Contractor shall be responsible for any costs and delays associated with gaining access to any installation needing restraints or supports.

3.12 PENETRATIONS

A. Acoustical: All penetrations through acoustically treated walls shall be sealed with non-hardening resilient acoustic sealant.

B. Waterproofing:

1. All penetrations through exterior walls and beneath slabs-on-grade shall be sealed with weatherproofing material.
2. All below grade conduit penetrations through the walls shall be individually sealed with Link-Seal or equal.
3. Provide flashings at exterior wall and roof penetrations. Caulk watertight penetrations of above grade walls, roofs and floors.

3.13 FIRE STOPPING

A. Provide sealing or stuffing material or assembly in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat and hot gases through fire rated construction.

B. Materials and Products:

1. Provide material listed in the UL Fire Resistance Directory for the UL system involved to achieve fire ratings of adjacent construction.

2. Materials shall have been tested to provide fire rating at least equal to that of the construction.
3. All fire stopping products shall be from a single manufacturer.

C. Environmental Requirements:

1. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
2. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.
3. Provide ventilation in areas to receive solvent cured materials and as required by manufacturer.

3.14 IDENTIFICATION

A. The Contractor shall identify all conduit, cabling, devices, and equipment in accordance with SECTION 26 05 53 – IDENTIFICATION for ELECTRICAL SYSTEMS.

B. The Contractor shall submit a schedule for equipment identification.

3.15 SETTING OF PROTECTIVE DEVICES

A. Prior to final completion of the Project, set all protective device relays and internal settings to provide adjustment between upstream and downstream protective devices. Settings shall be based on the accepted coordination study.

3.16 OPERATIONAL TESTS

A. Before acceptance tests are performed, demonstrate to the District's Representative that all systems and components are complete and fully operational.

B. Perform operational tests on all equipment to determine compliance with Specifications.

3.17 FINAL INSPECTION

A. As the work nears completion, review the requirements of the Contract Documents, inspect the work and inform all parties involved in work to be corrected or completed before the project can be deemed substantially complete.

B. When the project is substantially complete, notify the District's Representative in writing of this fact, listing those items of work remaining incomplete, the reason for incompleteness, and the anticipated date that all remaining work will be completed. Carry out own final inspection and be satisfied that the work is complete. Final inspection of the project will then be scheduled by the District's Representative.

C. The District's Representative reserves the right to cancel and reschedule the inspection in the event considerably more work remains to be completed or corrected than indicated in the written request for inspection.

D. All items not completed or found not complying with drawings or specifications by the District's Representative will be identified in an inspection report by District's Representative.

E. Correct all items on inspection report. Make the correction and initial and date each item on the report after corrections have been completed.

3.18 PROJECT CLOSE-OUT

A. Prior to requesting District's Representative's inspection for certification of substantial completion, complete the following and list known exceptions in request:

1. Obtain final inspections and approvals from all governmental jurisdictions that are required for the project.
2. Submit record drawings, maintenance manuals, warranties, and similar final record information.
3. Deliver tools, spare parts, extra stocks of materials, and similar physical items to the District.

4. Complete start-up, testing and demonstration of systems to the satisfaction of the District's Representative that the entire installation is complete, properly adjusted and is in proper operating condition.
5. Complete final cleaning requirements.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.

2. Connectors, splices, and terminations rated 600 V and less.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.03 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.01 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are limited to the following:

1. Southwest Wire

2. American Insulated Wire

3. Encore Wire Corp.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

2. RoHS compliant.

3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 AND ASTM B 496 for stranded conductors.

E. Conductor Insulation:

1. Type THHN and Type THWN-2: Comply with UL 83.

2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.

3. Type XHHW-2: Comply with UL 44.

2.02 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. 3M Electrical Products.

2. AFC Cable Systems; a part of Atkore International.

3. Ideal Industries, Inc.

4. ILSCO.

5. O-Z/Gedney; a brand of Emerson Industrial Automation.

C. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.

2. Type: One/Two hole with standard]/long barrels.

3. Termination: Compression/Crimp.

D. Lighting Whips

1. The use of MC cable is permitted for lighting installations. The length of the whip shall not exceed 6 feet.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper for all feeder Conductors and shall be solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

C. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway; Type XHHW-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway; Type XHHW-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway; Type XHHW-2, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in conduits in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.04 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. It is the intent of District and the Engineer that no splices shall be made in the run and shall be terminated only at equipment terminals, if this is impractical it will be reviewed and approved on a case by case basis.

C. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced con

ductors.

D. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.05 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.06 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.07 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according UL listing.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes grounding and bonding systems and equipment.

B. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Underground distribution grounding.

2. Foundation steel electrodes.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Final Report: A final report shall be submitted summarizing the data, assumptions computation results, conclusions and recommendations. The final report shall include the computation test results witnessed and signed by IOR.

1.03 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article.

B. Qualification Data: For testing agency and testing agency's field supervisor.

C. Field quality-control reports.

1.04 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1. Plans showing as-built, dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:

a. Test wells.
b. Ground rods.
c. Grounding arrangements and connections for separately derived systems.

2. Instructions for periodic testing and inspection of grounding features at test wells, ground rings and grounding connections for separately derived systems based on NETA MTS, NFPA 70B and CEC Article 250.

a. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
b. Include recommended testing intervals.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.02 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Burndy; Part of Hubbell Electrical Systems.

2. ERICO International Corporation.

3. ILSCO.

4. O-Z/Gedney; a brand of Emerson Industrial Automation.

2.03 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V and 5kv as applicable unless otherwise required by applicable Code or authorities having jurisdiction.

B. Conductors must be large enough to handle any anticipated faults without fusing (melting). Table 1, which is derived from IEEE 80-1986, IEEE Guide for Safety in AC Substation Grounding, lists the maximum allowable fault current (in kA) for various conductor sizes and fault durations.

C. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.

2. Stranded Conductors: ASTM B 8.

3. Tinned Conductors: ASTM B 33.

4. Bonding Cable: 28 Kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.

5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

D. Grounding Bus: Predrilled rectangular bars of annealed copper, 1 inch by 24 inches in cross section, with holes suitable for conductors installed spaced 3 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.04 CONNECTORS

A. Note: The connections between conductors and the main grid, and between the grid and ground rods, are very important as the conductors themselves in maintaining a permanent low-resistance path to ground. Must consider the type of bond the connection creates with the conductor or ground rod and temperature limits. The most frequently used grounding connections are mechanical pressure-type (bolted, compression, and wedge) and exothermically welded. Pressure-type connections produce a mechanical bond between conductor and connector. This connection either holds the conductors in place or squeezes them together, providing surface-to-surface contact with the exposed strands. The project design requires exothermically welded process fuses the conductor ends together to form a molecular bond between all strands of the conductor. Temperature limits are important considerations. How effectively a connection carries current indicates how well it will maintain low resistance. IEEE 80 rates the maximum allowable temperature limits for both pressure-type and welded connections. IEEE 837 gives additional information. All electrical grounding system shall be provided with Exothermic weld

B. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

E. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.

F. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

G. Cable-to-Cable Connectors: Compression type, copper.

H. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

I. Conduit Hubs: Mechanical type, terminal with threaded hub.

J. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

K. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

L. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.

M. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.

N. Straps: Solid copper, copper lugs. Rated for 600 A.

O. U-Bolt Clamps: Mechanical type, copper, terminal listed for direct burial.

P. Water Pipe Clamps:

1. Mechanical type, two pieces with stainless-steel bolts.

a. Material: Die-cast zinc alloy.
b. Listed for direct burial.

2. U-bolt type with malleable-iron clamp and copper ground connector.

2.05 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, sectional type, 3/4 inch by 10 feet. For maximum efficiency, rods should be placed no closer together than the length of the rod. Normally, this is 10 ft. Each rod forms an electromagnetic shell around it, and when the rods are too close, the shells actually interfere with each other. Sectionalizing type ground rods are required.

B. Ground Plates: 1/4-inch-thick, hot-dip galvanized.

2.06 GROUND BOXES

1. Ground Boxes – acceptable manufacturers are limited to the following:

a. Christy Concrete
b. Jensen Precast

PART 3 - EXECUTION

3.01 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, AWG as indicated on the drawings as minimum.

1. Bury at least 24 inches below grade, comply with CEC Article 305.

C. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.

2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

D. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.

2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.

3. Connections to Ground Rods at Test Wells: Bolted connectors.

4. Connections to Structural Steel: Welded connectors.

3.02 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

B. Provide Ufer grounds utilizing the concrete foundation of a structure plus building steel/rebar as a grounding electrode. Even if the anchor bolts are not directly connected to the reinforcing bars (rebar), their proximity and the semi-conductive nature of concrete will provide an electrical path.

3.03 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Transformer: Install grounding electrode(s) at the Transformer location. The electrode shall be connected to the equipment grounding conductor and to the frame of the transformer.

3.04 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding vaults and pull boxes: Install a driven ground rod through pull box or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before pull box/vault is placed and provide No. 3/0 AWG bare, copper conductor from ground rod into pull box/vault through a waterproof sleeve in vault wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, non-shrink grout.

C. Grounding Connections to vault/pull box Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons and cable shields within each pull box/vault or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors' level or plumb around corners and fasten to vault/pull box walls.

3.05 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.

2. Single-phase motor and appliance branch circuits.

3. Three-phase motor and appliance branch circuits.

4. Flexible raceway runs.

5. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

3.06 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

3.07 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a certified field testing company.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells and at individual ground rods. Make tests at ground rods before any conductors are connected.

a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports. All test shall be witnessed by IOR and shall sign the test reports.

E. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.

2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.

3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.

4. Vault/pull box Grounds: 10 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, provide additional sectionalizing ground rods until required test values are obtained.

3.08 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain and to use of grounding systems.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Structural steel for fabricated supports and restraints.
5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
6. Fabricated metal equipment supports assemblies.

B. Related Requirements:

1. Section 260548 "Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable rails, and frames for equipment mounting.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Provide details, drawn to scale, and coordinated with each other, using input from installers of the items involved.

B. Seismic Qualification Data: Certificates, for hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.

C. Welding certificates.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M/ AWS D1.2/D1.2M.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M.
2. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the supported equipment and systems will be fully operational after the seismic event]."

2. Component Importance Factor: 1.5.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Allied Tube & Conduit; a part of Atkore International.

b. B-line, an Eaton business.

c. ERICO International Corporation.
d. Thomas & Betts Corporation; A Member of the ABB Group.
e. Unistrut; Part of Atkore International.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel.
4. Channel Width: Select for applicable load criteria 1-5/8 inches minimum.
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1) Hilti, Inc.
2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
3) MKT Fastening, LLC.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1) Hilti, Inc.
2) ITW Ramset/Red Head; Illinois Tool Works, Inc.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F 3125/F 3125M, Grade A325 (Grade A325M).
6. Toggle Bolts: Stainless - steel springhead type.
7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA 1.
2. NECA 101
3. NECA 102.
4. NECA 105.
5. NECA 111.

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as [required by] [scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in] NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT/GRC/IMC may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lbs.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69, Spring-tension clamps].
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements for site-fabricated metal supports and manufacturer's recommendation.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

END OF SECTION

SECTION 26 05 29A
ELECTRICAL EQUIPMENT NOISE CONTROL, VIBRATION ISOLATION AND SEISMIC RESTRAIN

PART 1 - GENERAL

1.01 SCOPE.

A. Work included in this Section.

Principal items of work include the following:

1. Vibration isolation of transformers.
2. Vibration isolation of UPS
3. Vibration isolation of inverter.
4. Flexible conduits at transformer connections.
5. Flexible conduits at connections to motors and other vibrating equipment.
6. Electrical box-pads at stud partitions where sound insulation is provided.
7. Seismic restraint for vibration isolated equipment.

1.02 GENERAL REQUIREMENTS.

A. Coordination.

The contractor shall coordinate his work with other trades to avoid rigid contact between isolated transformers, raceways, and the building. He shall inform other trades following his work to avoid any contact which would reduce the vibration isolation.

B. Conflicts and Discrepancies.

1. The contractor shall bring to the architect's attention prior to installation any conflicts with other trades which will result in unavoidable contact to the equipment, raceways, etc., described herein, due to inadequate space, etc. Corrective work necessitated by conflicts after installation shall be at the responsible contractor's expense.
2. The contractor shall bring to the architect's attention any discrepancies between the specifications and field conditions, changes required due to specific equipment selection, etc., prior to installation. Corrective work necessitated by discrepancies after installation shall be at the contractor's expense.

C. Inspection and Instruction.

1. The contractor shall obtain inspection and approval from the architect of any installation to be covered or enclosed prior to such closure.
2. The contractor shall obtain written and/or oral instructions from the vibration isolation manufacturer as to the proper installation and adjustment of vibration isolation devices and seismic restraints.

1.03 SUBMITTAL.

A. Reference shall be made to general conditions for requirements pertaining to submittals, including preparation and transmittals. The submittal shall contain the following information:

1. Catalog cuts and data sheets on specific vibration isolators, mufflers, electrical box pads and other equipment to be utilized, showing compliance with the specification.

1. An itemized list showing the items of equipment to be isolated, the isolator type and model number selected, isolator loading and deflection.

2. The contractor shall obtain written and/or oral instructions from the vibration isolation manufacturer as to the proper installation and adjustment of vibration isolation devices and seismic restraints.

1.04 ISOLATOR CONFIGURATION FOR FLOOR MOUNTED OR SUSPENDED EQUIPMENT.

A. A maximum of four vibration isolators shall be provided, located at the corners of the equipment unless approval is obtained for additional isolators.

1.05 SEISMIC RESTRAINT REQUIREMENTS

A. Seismic restraint shall be furnished and installed in accordance with all relevant State and local code requirements.

1.06 RESPONSIBILITY OF MANUFACTURER.

Vibration isolation manufacturer shall have the following responsibilities:

A. To determine vibration isolation sizes and locations.

B. To provide equipment isolation system as scheduled or specified.

C. To guarantee specified isolation system deflection.

D. To provide installation instructions and drawings.

E. To provide calculations signed by a structural engineer licensed in the State in which the work is to take place certifying that the seismic restraints will act in accordance with the relevant State and local codes and will maintain equipment in captive position.

1.07 VIBRATION ISOLATION AND NOISE CONTROL REQUIREMENTS.

A. Floor Mounted Transformers.

1. Type E, 0.15 inch static deflection.

2. Locate at 4 corners of transformer.

3. Bolt to floor.

4. Wall mounted not permitted.

B. Inverter

1. Type E, 0.15-inch static deflection.

2. Locate at 4 corners of Inverter.

3. Bolt to floor.

C. UPS

1. Type E, 0.15-inch static deflection.

2. Locate at 4 corners of Inverter.

3. Bolt to floor.

D. Flexible Electrical Connections.

1. At all transformers within buildings.

2. At connections to motors or other vibrating equipment.

1.08 ELECTRICAL BOX PADS.

A. Provide at all junction boxes located within sound insulated drywall partitions.

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATORS.

A. General Properties

1. All vibration isolators shall have either known undeflected heights or other markings so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the design.

2. All isolators shall operate in the linear portion of their load versus deflection curve. Load versus deflection curves shall be furnished by the manufacturer and must be linear over a deflection range 50% above the design deflection.

3. The ratio of lateral to vertical stiffness shall not be less than 1.0 or greater than 2.0.

4. The vertical natural frequency for each support point, based upon the load per isolator and isolator stiffness, shall not differ by more than + or - 10%.

B. Isolator Types and Descriptions.

Type E is a neoprene isolator capable of resisting a seismic load of 1.0 G in all directions. The mount shall consist of a captive steel insert embedded into a neoprene element which is enclosed by a steel housing which also includes floor mounting holes. The isolator shall have a rated deflection of 0.15 inches in compression, 0.12 inches in tension and 0.09 inches in shear.

2.02 FLEXIBLE CONNECTIONS.

A. Conduit over 1 inch OD: Make electrical connections to vibrating equipment via flexible expansion/deflection conduit coupling sized as required. Coupling shall have a flexible and watertight outer jacket, an internal grounding strap, plastic inner sleeve to maintain smooth wireway, and end hubs with threads to fit standard threaded metal conduit. Acceptable units include:

1. XD Expansion Deflection Coupling by Crouse-Hinds of Syracuse, N.Y.

2. Type DF Expansion and Deflection fitting by Spring City Electrical Mfg. Co. of Spring City, PA.

B. For conduit under 1 inch OD: Use "flexible" conduit with slack at least 3 feet or 15 diameters long, whichever is the longer or provide a flexible coupling as defined above.

2.03 ELECTRICAL BOX PADS.

A. Equal to Lowry's Outlet Box Pads as manufactured by Harry A. Lowry Associates, Sun Valley, California.

2.04 EQUIPMENT FRAMES.

A. General.

Mounting frames and/or brackets shall be provided to carry the load of the equipment without causing mechanical distortion or stress to the equipment.

B. Frame Types.

1. Type WFB frame is a wide flange structural steel frame with brackets as shown on the drawings. The maximum allowable deflection of any point on the loaded frame relative to the unloaded frame shall be 0.005 inch. A wide flange section depth greater than 1/10th

the length of the longest frame member will be accepted as satisfying the deflection requirement.

2.05 SEISMIC RESTRAINTS.

Isolation mounts shall be provided with integral seismic restraints.

PART 3 - EXECUTION

3.01 INSTALLATION OF VIBRATION ISOLATION DEVICES.

A. Transmission of perceptible vibration or structure borne noise to occupied areas by equipment installed under this Contract will not be permitted.

B. Vibration isolators shall be installed per manufacturer's directions.

C. Use of vibration isolators for Inverter shall be coordinated with supplier.

D. Flexible electrical connections.

1. Installation of flexible electrical connections to vibration isolated equipment shall in no way impair or restrain the function of the aforementioned vibration isolation.

2. Option 1: Install the flexible conduit in a grossly slack loop form or shallow "U" form. Install the stranded conductors with sufficient slack to accommodate maximum possible movement.

3. Option 2: The flexible coupling shall be free and not in contact with any nearby building construction and shall be installed slack and free of strain in any direction. Install stranded conductors as above.

E. All vibration isolation devices, including auxiliary steel bases shall be designed and furnished by a single manufacturer or supplier, who will be responsible for adequate coordination of all phases of this work.

F. The vibration isolation manufacturer, or his representative, shall be responsible for providing such supervision as may be necessary to assure correct installation and adjustment of the isolators. Upon completion of the installation and after the system is put into operation, the manufacturer, or his representative, shall make a final inspection and submit his report to the Architect in writing, certifying the correctness of installation and compliance with approved submittal data.

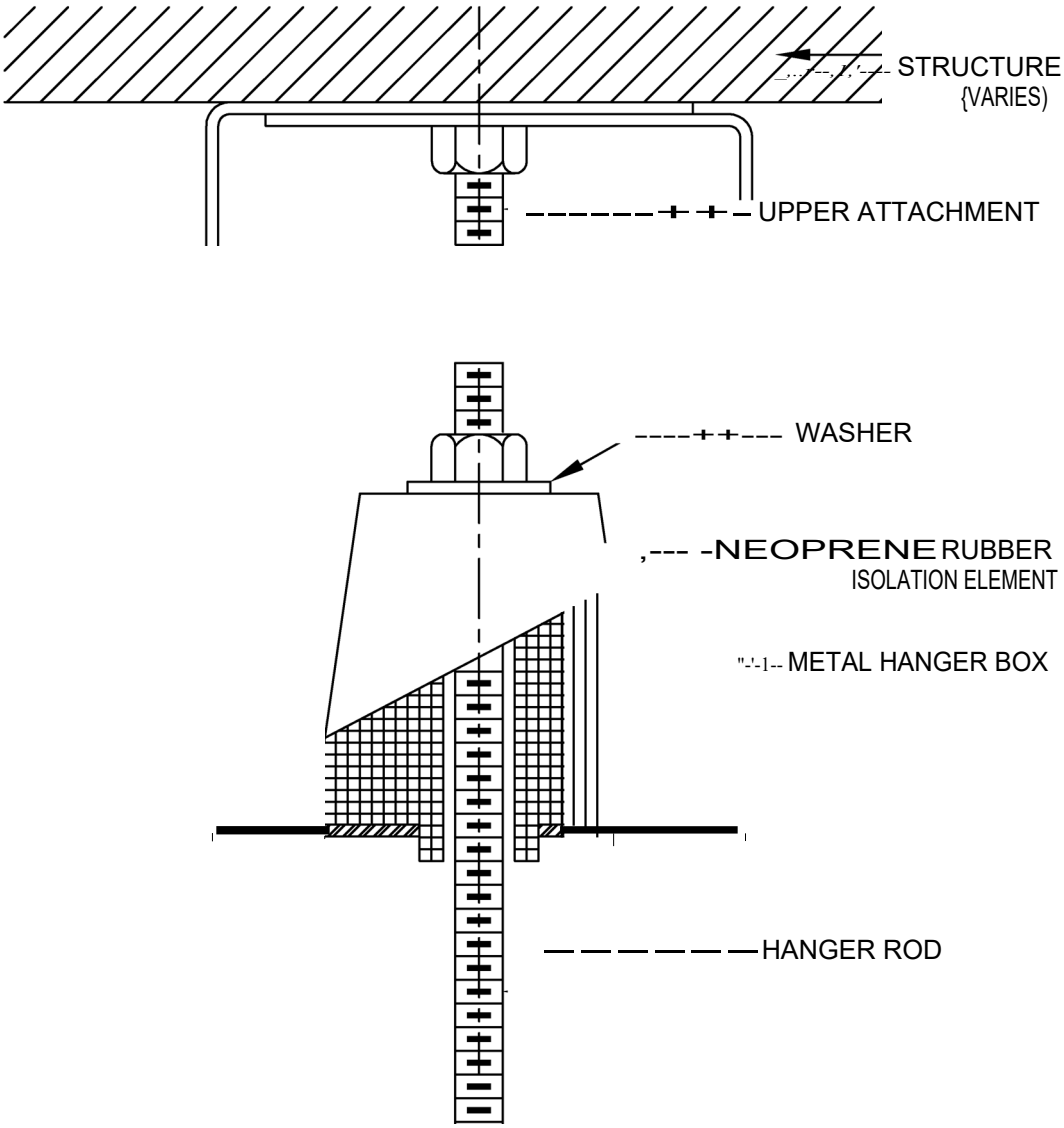
3.02 OUTLET BOX PADS.

All holes in outlet boxes in sound rated walls shall be completely covered with electrical box pads molded and pressed to the back side of the box.

3.03 COORDINATION.

The contractor shall coordinate his work with other trades to avoid rigid contact between isolated equipment and raceways with the building. He shall inform other trades following his work to avoid any contact which would reduce the vibration isolation.

END OF SECTION



NOTES:

1. WHEN MOUNTING EQUIPMENT, ALIGN HANGER ROD TO CLEAR HANGER BOX.
2. MOUNT HANGER BOX DIRECTLY AGAINST STRUCTURAL ELEMENT.
3. DO NOT SUPPORT HANGER FROM SLAB DIAPHRAGMS.

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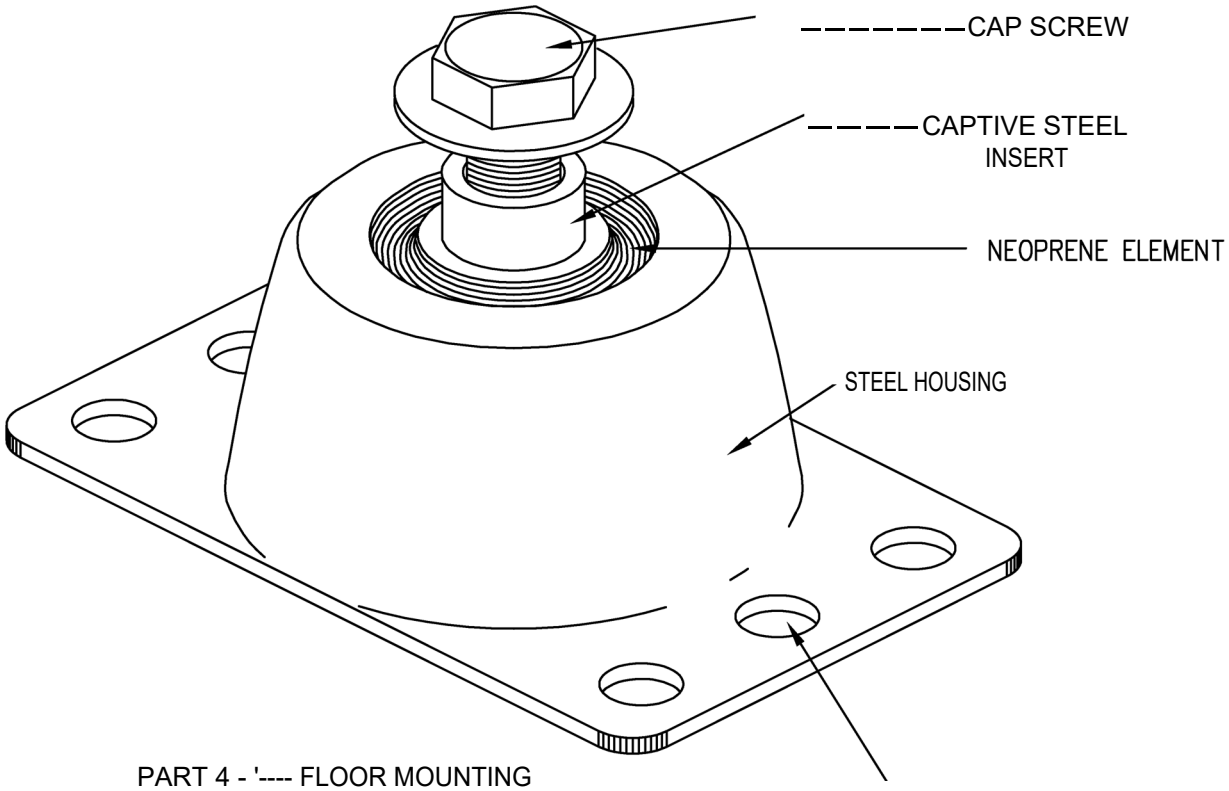
ISOLATOR-TYPE F, NEOPRENE HANGER



PART 4 - '---- FLOOR MOUNTING

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TYPE E VIBRATION ISOLATOR

Appendix A Electrical Equipment Vibration Isolation Requirements Table 1 - Equipment Isolation Requirements

Equipment Type	Isolator Type	Minimum Static Deflection (inches)
Floor-Mounted Dry-Type Transformers	E	0.15
Distribution Panels Connected to Transformers	E	0.10
UPS/Inverter	E	0.10
Suspended Raceways between Unit Substations and Distribution Panels	F	0.20

Table 2 - Isolator Type Information

Isolator Type	Detail	Isolator Description
E	37	Neoprene isolator capable of resisting a seismic load of 1.0 G in all directions. The mount shall consist of a captive steel insert embedded into a neoprene element which is enclosed by a steel housing which also includes floor mounting holes. The isolator shall have a minimum rated deflection of 0.15 inches in compression, 0.12 inches in tension and 0.10 inches in shear. Locate at 4 corners of transformer. Bolt to floor. Wall-mounted not permitted.
F	3	Suspension hanger with a steel box frame and a molded neoprene in shear element. A neoprene grommet shall be provided at the location where the hanger rod passes through the hanger box so that no metal-to-metal contact occurs.

Additional Notes:

1. Provide electrical box pads at all junction boxes located within sound insulated drywall partitions. Equal to Lowry's Outlet Box Pads as manufactured by Harry A. Lowry Associates, Sun Valley, California.
2. Provide Flexible Electrical Connections:
    a. At all transformers within buildings.
    b. At connections to motors or other vibrating equipment.
    c. **Conduit over 1 inch OD:** Make electrical connections to vibrating equipment via flexible expansion/deflection conduit coupling sized as required. Coupling shall have a flexible and watertight outer jacket, an internal grounding strap, plastic inner sleeve to maintain smooth wireway, and end hubs with threads to fit standard threaded metal conduit. Acceptable units include:
        i. XD Expansion Deflection Coupling by Crouse-Hinds of Syracuse, N.Y.
        ii. Type DF Expansion and Deflection fitting by Spring City Electrical Mfg. Co. of Spring City, PA
    d. **For conduit under 1 inch OD:** Use "flexible" conduit with slack at least 3 feet or 15 diameters long, whichever is the longer or provide a flexible coupling as defined above.

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.
5. Boxes, enclosures, and cabinets.
6. Handholes, pull boxes, vaults and boxes for exterior underground cabling.

B. Related Requirements:

1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior duct banks, vaults/pull boxes and underground utility construction.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Seismic Qualification Data: Certificates, for enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Wheatland Tube Company.
    b. Allied Tube & Conduit; a part of Atkore International.
    c. Republic Conduit
    d. O-Z/Gedney; a brand of Emerson Industrial Automation.
    e. Western Tube and Conduit Corporation.

2. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. IMC: Comply with ANSI C80.6 and UL 1242.
5. PVC-Coated Steel Conduit: PVC-coated [rigid steel conduit] [IMC].

    a. Comply with NEMA RN 1.
    b. Coating Thickness: 0.040 inch, minimum.

6. EMT: Comply with ANSI C80.3 and UL 797.
7. FMC: Comply with UL 1; zinc-coated steel.
8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings: Comply with NEMA FB 1 and UL 514B.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following (District Standard):

    a. Steel City
    b. O-Z Gedney

2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Fittings, General: Listed and labeled for type of conduit, location, and use.
4. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
5. Fittings:

    a. Material: die cast.

b. Type: compression type only (set screw types not permitted).

6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
7. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

C. Joint Compound for IMC, GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit; a part of Atkore International.
b. PW Eagle
c. Calbond; a part of Atkore International.
d. CANTEX INC.
e. Carlon

B. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
2. LFNC: Comply with UL 1660.

C. Nonmetallic Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit; a part of Atkore International.
b. PW Eagle
c. Calbond; a part of Atkore International.
d. CANTEX INC.
e. Carlon

2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
4. Fittings for LFNC: Comply with UL 514B.
5. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 FLEXIBLE METALLIC TUBING

1. Flexible metallic tubing shall be steel only and no smaller than 3/4 inch in size. Shall be used only between junction boxes where the installation does not permit the use of EMT. Flexible metallic tubing shall not be used for home runs.

2.4 METAL WIREWAYS AND AUXILIARY GUTTERS

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel City
2. Appleton
3. Circle AW.
4. Hoffman; a brand of Pentair Equipment Protection.

E. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1/Type 3R/Type 4 Type 12 unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.3 SURFACE RACEWAYS

A. MANUFACTURES

1. Legrand Wiremold, 5500 WH series (white).

B. Shall have snap on covers (twin snap on where applicable), low profile, lightweight PVC (meet flammability requirements),
C. UL listed for 600V.
D. Provide multi-channel where applicable, do not exceed a 20% fill ratio.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel City
2. Appleton
3. Circle A W
4. Hoffman

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

J. Gangable boxes are allowed.

K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1/Type 3R/Type 4/ Type 12 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

L. Cabinets:

1. NEMA 250, Type 1/Type 3R/Type 12 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 HANDHOLES, VAULTS AND PULL BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Christy Concrete
2. Jensen Precast

B. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC/IMC
2. Concealed Conduit, Aboveground: GRC/IMC/EMT.
3. Underground Conduit: RNC, Type EPC-40-PVC/Type EPC-80-PVC.
4. Connection to Vibrating Equipment (Including Transformers Motor-Driven Equipment): LFMC/LFNC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed and Subject to Severe Physical Damage: GRC/IMC. Raceway locations include the following:
    a. Mechanical/storage/electrical rooms.
    b. Gymnasiums.
3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations. Whips are limited to six feet.
5. Damp or Wet Locations: GRC/IMC.
6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
7. MC cable maybe be used for lighting whips, no longer than 6’ in length.

C. Minimum Raceway Size: 3/4-inch trade size.
D. Flexible conduit shall only be used between junction boxes where the installation doesn’t permit EMT. Flexible conduit is not permitted for home runs. Minimums size shall be ¾”.
E. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use compression, cast-metal fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
G. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
D. Do not fasten conduits onto the bottom side of a metal deck roof.
E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
F. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
J. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
K. Support conduit within 12 inches of enclosures to which attached.
L. Raceways Embedded in Slabs: No raceways shall be embedded in concrete slab or equipment pads.
M. Below ground conduits shall transition to Rigid Steel at rise through concrete and where attached to permanent structure or temporary building.
N. Stub-ups to Above Recessed Ceilings:

    1. Use EMT, IMC for raceways.
    2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

O. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
P. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
Q. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
R. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
S. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
T. Surface Raceways:

    1. Install surface raceway with a minimum 2-inch radius control at bend points.
    2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section.

Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

U. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.

V. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where an underground service raceway enters a building or structure.
2. Conduit extending from interior to exterior of building.
3. Where otherwise required by NFPA 70.

W. Expansion-Joint Fittings:

1. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
2. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

X. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

Y. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. Locate boxes so that cover or plate will not span different building finishes.

BB. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

DD. Ground Boxes:

Ground boxes shall be installed flush with finished grade with at least 6 inches of ¾ inch gravel at the base for drainage. In all cases lids shall be traffic rated and labeled as to the content of the box. Where larger boxes (i.e. 2'x3' or 3'x5') are specified, spring-loaded lids shall be specified. Where the conduit enters the box, the PVC shall be flush with the finished surface of the box and fitted with a bell end. The conduit shall be mortared in place. The conduits shall be evenly spaced and in a straight line. All cable runs shall be securely attached to the wall via a cable rack.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Refer to specification section 26 05 43

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Refer to specification section 26 05 43
B. Underground Conduit Runs

The use of PVC schedule 40 or 80 is permitted for underground conduit runs but must transition to rigid conduit at the riser to attach to any permanent structure or temporary building.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements of UL for "Penetration Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks, and in single duct runs.
2. Vaults, Pull Boxes and Handholes boxes.
3. Rigid steel conduit
4. Rigid Intermediate Conduit
5. Rigid non-metallic conduit
6. PVC coated metal conduit
7. Hand holes
8. Vaults
9. Damp proofing material
10. Duct sealing compound

B. Related Work: Refer to all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

C. System Description: Conduit and duct routing, handhole and manhole locations are shown in approximate locations unless dimensions are indicated. Route and locate interconnected system of encased conduits, ducts, hand holes, and manholes to complete the underground distribution system.

1. Use rigid non-metallic PVC Schedule 40/80 conduit for all underground and concrete encased applications.

2. Underground conduit runs but must transition to rigid conduit at the riser to attach to any permanent structure or temporary building within 5’ of the building.

3. Use rigid steel conduits for all elbows and bends.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified.

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

2. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

3. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures

4. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures

5. ASTM C1037 - Standard Practice for Inspection of Underground Precast Concrete Utility Structures

6. IEEE C2 - National Electrical Safety Code

7. NFPA 70 - National Electrical Code (NEC) with California Amendments

8. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit

9. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing

10. UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit

1.03 SUBMITTALS

A. Submit in accordance with the requirements of Section 26 00 00 – Common Work Results for Electrical, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical characteristics and indicating compliance with all listed standards.

a. Thickness of all metals
b. Reinforcing iron dimensions and placement
c. Concrete dimensions.
d. Dimensions or pull irons and gages.
e. Cable rack irons dimensions and mounting method.
f. Interior dimensions.
g. Method of construction
h. Duct-bank materials, including separators and miscellaneous components.
i. Ducts and conduits and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
j. Accessories for manholes, vaults, pull boxes and handholes, boxes, and other utility structures.
k. Warning tape.

B. Shop Drawings for Precast or Factory-Fabricated Underground Utility Structures: Shop drawings shall Include plans, elevations, sections, details, attachments to other work, and accessories, including the following:
1. Duct entry provisions, including locations and duct sizes.
2. Reinforcement details.
3. Frame and cover design and manhole frame support rings.
4. Ladder details.
5. Grounding details.
6. Dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
7. Joint details.
8. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
9. Shop Drawings: Indicate dimensions, “Butterfly” layouts, size and locations of openings, and accessory locations for precast manholes.
10. Submit manufacturer's installation instructions.

1.04 INFORMATIONAL SUBMITTALS

A. Duct-Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.

1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.

B. Product Certificates: For concrete and steel used in precast concrete manholes and handholes, as required by ASTM C 858.

C. Qualification Data: For professional engineer.

D. Source quality-control test reports.

E. Field quality-control test reports.

F. Submit Certification/analysis indicating compliance with H2O truck loading and applicable Seismic Design Category in conformance with CBC requirements.

1.05 QUALITY ASSURANCE

A. All products shall be UL labeled for their intended use.

B. Comply with the current edition of Northwestern Design Standards, including IT/IS Standards for Low Voltage systems pathways.

C. Comply with ANSI C2.

D. Comply with NFPA 70.

1.06 COORDINATION

A. Coordinate with existing underground utilities and structures.

B. Coordinate with work indicated on Architectural, underground existing utilities and other consultants' drawings.

C. Coordinate layout and installation of ducts, vaults, pull boxes and handholes with final arrangement of all utilities, site grading and surface features as determined in the field.

D. Coordinate elevations of ducts and duct-bank entrances into vaults, pull boxes and handholes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to vaults, pull boxes and handholes and as approved by Architect.

E. Interruption of existing electrical service: do not interrupt electrical service to facilities occupied by the School or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify the District & the Architect no fewer than 21 calendar days in advance of pro

posed interruption of electrical service.

2. Do not proceed with interruption of electrical service without the District's written permission.

3. District's lock-out/tag-out procedures shall be used with contractor-controlled locks and tags.

4. Comply with NFPA 70E.]

PART 2 - PRODUCTS

2.01 RIGID STEEL CONDUIT

A. Galvanized, comply with ANSI C80.1

2.02 RIGID NON-METALLIC CONDUIT

A. RNC: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.03 PVC COATED METAL CONDUIT

1.1 NONMETALLIC DUCTS AND DUCT ACCESSORIES.

A. Underground ducts:

1. PVC Conduit for direct burial Schedule 40, UL Labeled for 90-degree C Cables. Fittings shall be Schedule 40, solvent type, from same manufacturer.

2. Sleeves shall be Schedule 40 PVC conduit, 6-inch diameter.

3. Marker Tape shall be Plastic, vinyl or mylar, 6-inch wide and orange in color for telecommunications and labeled to indicate cable type. ARNCO Corp or equal.

4. Lesser Grade conduit and fittings are disallowed.

B. Duct Accessories:

1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.

2. Warning Tape: Underground-line warning tape specified in Division 26 Section "Identification for Electrical Systems."

3. Concrete Warning Planks: Nominal 12 by 24 by 3 inches in size, manufactured from 6000-psi concrete.

a. Mark each plank with "ELECTRIC" in 2-inch- high, 3/8-inch deep letters.

2.04 Vaults

A. Low voltage (below 600 volts) and Telecom underground pull box 2'-0" x 3'-0" x 36" Deep or 3'-0" x 5' -0" x 48" deep or as specified by Jensen precast or Christy Concrete (district standard) with two-piece spring loaded traffic cover labeled to the contents of the box and electric or telecom/signal, installation of pull box shall be per manufacturers installation procedures. Sump shall be broken for drainage. Provide ¾" dimeter x 8' long copper clad ground rod with ultra weld connection mold & weld metal) and 1 # 3/0 bare copper wire and connect to structural steel rebar at pull box. Pull box shall be placed on a minimum 6" of ¾" crushed rock for drainage at the base run for ease of installation & even load distribution. All low voltage 600 volts & below) & telecom cables shall be provided with cable loop & cable supports. No cable splices are permitted.

2.05 HANDHOLES

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following (district standard):

1. Jensen Precast

2. Christy Concrete

B. Description: Handhole comprising modular, interlocking sections complete with accessories.

1. Loading: ASTM C857, Class A-16

2. Shape: Rectangular or as indicated on Drawings.

3. Nominal inside Dimensions: 17"x 30"

4. Inside Depth: 12", provide extension rings to match required depth.

5. Wall Thickness: 4"

6. Utility underground pull box 17" x 30" x12" deep with extension rings pull box: Jensen precast" ht1017-b 9box), ht1017-e (12" extension ring as required), with steel Traxplate bolt down slip resistance cover lid, installation of pull box shall be per manufacturers installation procedures. Pull box shall be placed on a minimum 6" crushed ¾" gravel rockfor ease of installation & even load distribution. Cover marked "telecom" or "electric" as applicable.

7. Ground Well box: J & R Concrete No. E6 – RT Series or approved equal.

8. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.

9. Where the conduit enters the box, the PVC shall be flush with the finished surface of the box and fitted with a bell end. The conduit shall be mortared in place. The conduits shall be evenly spaced and in a straight line. All cable runs shall be securely attached to the wall via a cable rack.

C. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2- inch (13-mm) ID by 2-3/4 inches (69 mm) deep, flared to 1-1/4 inches (32 mm) minimum at base.

1. Tested Ultimate Pullout Strength: 12,000 lbf (53 kN) minimum.

2. Arms: Arranged for secure, drop-in attachment in horizontal position at any location on cable stanchions, and capable of being locked in position. Arms shall be available in lengths ranging from 3 inches (75 mm) with 450-lb (204-kg) minimum capacity to 20 inches (508 mm) with 250-lb (114-kg) minimum capacity. Top of arm shall be nominally inches (100 mm) wide, and arm shall have slots along full length for cable ties.

D. Duct-Sealing Compound: Non-hardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F (2 deg C). Capable of withstanding temperature of 300 deg F (150 deg C) without slump and adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.

E. Cover Hooks: Heavy duty, designed for lifts 60 lbf (270 N). Two required.

2.06 SEAL – SLEEVE ASSEMBLIES

A. Products: “Link-Seal” ® by GPT Industries.

B. Exterior Wall or Stub-Ups through Floor: Modular seal assembly to provide a hydrostatic seal, using mechanical interlocking synthetic rubber links shaped to fill the annular opening between the conduit and the wall. Pressure plate shall be reinforced nylon-polymer. Hardware shall be stainless steel.

C. Sleeves shall be Schedule 40 galvanized steel pipe.

2.07 DAMPPROOFING MATERIAL

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. A.C. Horn Company "Dehydratine No. 4”.

2. Sonneborn Sons, Inc. "Hydrocide 648".

3. Toch Brothers "RIW Marine Cement Semi-Mastic"

2.08 FOAM SEALANT

A. Manufacturer: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Polywater Corporation – FST Foam Sealant high expansion foam duct sealant to keep water, acids, dust, gases, insects and rodents entering the ducts. Comply with 2014NEC 225.27,230.8 and 300.5(G) Raceway seals. Sealing shall be completed to form waterproof seal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Thoroughly examine site conditions for acceptance of pull-box or manhole installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 PREPARATION

A. The Contractor shall prepare and be responsible for an excavation in accordance with those shown on Vault/Manhole/pull boxes shop drawings. Prior to placing the precast substructure into the excavation, the Contractor shall provide base material at the bottom of the excavation. The base material shall be level and compacted to the proper elevation in conjunction with the conduit and the conduit entrance of vault/manhole as designated on the utility plans.

3.03 UNDERGROUND DUCT APPLICATION

A. Products and installation options in this Article are examples only. Coordinate with Drawings and edit to suit Project. See the Underground Raceway Application Chart and "Product Selection and Application Considerations" Article in the Evaluations. Coordinate with products listed in Part 2 "Nonmetallic Ducts and Duct Accessories" Article.

B. Verify application in paragraph below with utility if ducts are for service conductors provided by utility.

C. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-40 PVC, in concrete-encased duct bank, unless otherwise indicated.

D. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-40 -PVC, in direct-buried duct bank, unless otherwise indicated.

E. Underground Ducts for Telephone, Communications, or Data Utility Service Cables: RNC, NEMA Type EPC-40 PVC, in concrete-encased duct bank, unless otherwise indicated.

F. Underground Ducts for Telephone, Communications, or Data Circuits: RNC, NEMA Type EPC-40 PVC, in direct-buried duct bank, unless otherwise indicated.

G. Trenchless technology involving horizontal jacking, or boring or directional boring is often used for crossing obstructions such as described in paragraph below. Trenchless techniques are not specified in this Section but are described in the Evaluations.

H. Underground Ducts Crossing Paved Paths/Walks and Driveways: RNC, NEMA Type EPC-40-PVC, encased in reinforced concrete.

3.04 UNDERGROUND ENCLOSURE APPLICATION

A. Handholes, vaults and Pull Boxes for 600 V and Less, Including Telephone, Communications, and Data Wiring:

1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete. AASHTO HB 17, H-20 structural load rating.

2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Non-deliberate Loading by Heavy Vehicles: Precast concrete, H-20 structural load rating.

3. Units in Sidewalk and Similar Applications with a Safety Factor for Non-deliberate Loading by Vehicles: Precast concrete H-20 structural load rating.

3.05 UNDERGROUND BOXES

Ground boxes shall be installed flush with finished grade with at least 6 inches of ¾ inch gravel at the base for drainage. In all cases lids shall be traffic rated and labeled as to the content of the box. Where larger boxes (i.e. 2'x3' or 3'x5') are required, spring-loaded lids shall be specified. Where the conduit enters the box, the PVC shall be flush with the finished surface of the box and fitted with a bell end. The conduit shall be mortared in place. The conduits shall be evenly spaced and in a straight line. All cable runs shall be securely attached to the wall via a cable rack.

3.06 EARTHWORK

b. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

c. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary top soiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.

d. Cut and patch existing pavement in the path of underground ducts and utility structures according to Division 01 Section "Cutting and Patching."

1. A minimum compaction of 95% is required in paved areas, such as streets, parking lots or sidewalks. Higher compaction in all areas may be required by appropriate permits or inspectors. Compaction may be achieved utilizing mechanical means in 8-inch lifts. Compaction may also be accomplished by jetting with pressurized water. A concrete cap is required over sand backfilled conduits installed in landscaped areas or in areas where the depth of cover is less than 24 inches. The concrete cap is to cover the full width of the trench for the length of the applicable trench segment. The concrete cap shall be a minimum of 3 inches thick, have a minimum strength of 2500 pounds psi, and be red in color.

2. Coordinate installation of underground raceways with other outside and building construction work. Maintain existing outside utilities in operation.

3. Remove entirely and properly reinstall all raceway installations not in compliance with these requirements.

4. Provide a minimum cover of 24" over low voltage (communication - data fiber, coax and copper cabling) and 24 "over 600 voltage cables and 24" over wiring under 600 volts (Comply with NEC Table 300.5) underground raceways unless otherwise indicated.

5. Do not backfill underground direct burial and concrete-encased raceways until they have been inspected by the IOR, District or their representative.

6. Warning Tapes: Bury warning tapes approximately 18 inches above all underground conduit runs or duct banks. Align parallel to and within 12 inches of the centerline of runs.

7. Separation and Support

    a. Separate parallel runs of two or more raceways in a single trench with preformed, nonmetallic spacers designed for the purpose. Install spacers at intervals not greater than that specified in the NEC for support of the type of raceways used, and in no case greater than 10 feet.
    b. Support raceways installed in fill areas to prevent accidental bending until backfilling is complete. Tie raceways to supports, and raceways and supports to the ground, so that raceways will not be displaced when concrete encasement or earth backfill is placed.

8. Arrangement and Routing

    a. Arrange multiple conduits runs substantially in accordance with any details shown on the Drawings or as required due to field conditions. Locate underground conduits where indicated on the Drawings and graded to the required elevations.
    Make minor changes in location or cross-section as necessary to avoid obstructions or conflicts. Where raceway runs cannot be installed substantially as shown because of conditions not discoverable prior to digging of trenches, refer the condition to the Architect/District for instructions before further work is done.
    b. Slope duct banks downward, toward manholes, away from buildings, a minimum of 6” per 100’.
    c. Minimum 20’ bend radii for direction change
    d. Where other utility piping systems are encountered, maintain a 12-inch minimum vertical separation between raceways and other systems at crossings. Maintain a 12-inch minimum separation between raceways over couplings in other piping systems. Refer conflicts with these requirements to the Architect for instructions before further work is done.
    e. In multiple conduit runs, stagger raceway coupling locations so that couplings in adjacent raceways are not in the same transverse line.

2. Pull boxes/Vaults and Handholes:

    a. Install vaults, pull boxes and hand-holes where shown on the drawings. Provide excavation, shoring, bracing, backfilling, grading, etc., in accordance with requirements specified elsewhere in these contract documents.
    b. Do not install vaults, pull boxes or hand-holes until final conduit grading, including field changes necessitated by underground interferences, has been determined. Set frames to final grades as required.
    c. Make installation so that raceways enter vault/pull boxes/ hand-holes at nearly right angles and as near as possible to one end of a wall, unless otherwise indicated.
    d. Install one ground rod in each vault and pull boxes. Connect all noncurrent-carrying metal parts in the manhole and any metallic raceway grounding bushings to this ground rod with No. 3/0 bare copper ground conductor and approved ground clamp and as required per NEC.

3. Preparation for Pulling in Conductors

    a. Do not install crushed or deformed raceways. Avoid traps in raceways. Take care to prevent the lodging of concrete, dirt, or trash in raceways, boxes, fittings, and

equipment during the course of construction. Make raceways entirely free of obstructions or replace them. Ream all raceways, remove burrs, and clean raceway interior before introducing conductors or pull wires.

b. Immediately after installation, plug or cap all raceway ends with water-tight and dust-tight seals until the time for pulling in conductors.

c. For concrete-encased raceways, after the concrete envelope has set, pull a mandrel of a diameter approximately 1/4 inch less than the raceway inside diameter, through each raceway. Then pull a bristle brush through each raceway to remove debris.

4. Empty Raceways:

a. Certain raceways will have no cabling pulled in as part of the Contract. Identify with tags at each end and at any intermediate pull point the origin and destination of each such empty raceway. Where a raceway has been identified with a name (number) in the Raceway Schedule, use that name on the tag in lieu of origin and destination. Provide a removable permanent cap over each end of each empty raceway. Provide a 3/8" nylon pull cord in each empty raceway.

B. Encased Ducts: Support ducts on duct separators:

a. Separator Installation:
Space separators close enough to prevent sagging and deforming of ducts, with not less than 5 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately 6 inches between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.

3.07 Concreting Sequence:

A. Pour each run of envelope between vaults/pull boxes or other terminations in one continuous operation.

3.08 1. Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations or use other specific measures to prevent expansion contraction damage.

2. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4- inch reinforcing rod dowels extending 18 inches into concrete on both sides of joint near corners of envelope.

a. Pouring Concrete: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.

3. Reinforcement:
Reinforce concrete-encased duct banks where they cross disturbed earth and where

indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.

4. Forms:
Use walls of trench to form side walls of duct bank where soil is self -supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.

5. Minimum Space between Ducts: 3 inches between ducts and exterior envelope wall, 3 inches between ducts for like services, and 12 inches between power and signal ducts.

6. Depth: Install top of duct bank at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles, (24 inches for concrete encased duct bank) unless otherwise indicated. Of importance are the parts that require the duct installer to:

•Secure duct separators to the earth and the ducts to prevent floating during concreting.
•Spade concrete during the pours.
•Not use power-driven agitating equipment unless specifically designed for duct - bank application. We found this sentence to be interesting and checked to see if any vibrators were specifically designed for duct bank application, but could find no references to such vibrators, or to power driven agitating equipment.

3.09 Warning Tapes: Comply with section 260553. Bury warning tape approximately 18 inches above all duct banks. Align tape parallel to and within 3 inches of the centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

1. Provide a 1" PVC conduit centered in the top of the duct bank containing a green–jacketed #12 AWG copper "tracer" wire where applicable.

3.10 As Built Conduit Drawings

a. At the completion of Contract, provide as-built conduit Drawings showing location and depth of all conduits. Measure conduit locations from permanently fixed readily discernable landmarks such as building corners, columns, manhole centerline, etc.
b. Pull boxes to be located in landscape areas.
c. Pull boxes shall be size larger than required to loop the cable in and out of the pull box without exceeding the minimum bend radii of the cable being installed.
d. Ducts should enter manholes on the short side.

3.11 EVALUATION or COMMISSIONING

1. List of items or systems requiring testing, evaluation, verification, or commissioning:

a. Required: Contact Project Manager to arrange inspection prior to pouring concrete and backfilling excavations.

2. Documentation required:

a. Test reports: Concrete
b. In-person witnessing: Prior to concrete pouring and excavation backfill.

3. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

4. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary top soiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.

5. Cut and patch existing pavement in the path of underground ducts and utility structures according to Division 01 Section "Cutting and Patching."

3.12 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.

2. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.

3. Test handhold grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 26 Section "Grounding and Bonding for Electrical Systems."

B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.13 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Clean internal surfaces of manholes, including sump. Remove foreign material.

C. Cast Iron castings, covers, frames, manholes, vaults and pull boxes shall be cleaned and all debris shall be removed prior to final acceptance.

END OF SECTION

SECTION 26 05 44

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches , thickness shall be 0.052 inch.

b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Advance Products & Systems, Inc.
   b. CALPICO, Inc.
   c. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel/Stainless steel.
4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating/ Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, water-stop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber water-stop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work.

2.4 GROUT

A. Description: Non-shrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
C. Design Mix: 5000-psi, 28-day compressive strength.
D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.
B. Comply with NEMA VE 2 for cable tray and cable penetrations.
C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel/cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position water-stop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION

SECTION 26 05 48

SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Restraint channel bracings.

2. Restraint cables.

3. Seismic-restraint accessories.

4. Mechanical anchor bolts.

5. Adhesive anchor bolts.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.

a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES/OSHPD/an agency acceptable to authorities having jurisdiction (DSA).

b. Annotate to indicate application of each product submitted and compliance with requirements.

1.04 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis. They

shall bear anchorage preapproval from OSHPD in addition to preapproval, showing maximum seismic-restraint ratings, by ICC-ES or another agency acceptable to authorities having jurisdiction. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) that support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

D. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Wind-Restraint Loading:

1. Basic Wind Speed: 100MPH or as approved by structural engineer.

2. Building Classification Category: see architectural.

3. Minimum 10 lb/sq. ft. multiplied by maximum area of HVAC component projected on vertical plane normal to wind direction and 45 degrees either side of normal.

B. Seismic-Restraint Loading: Refer to Architectural and Structural drawings for Project classification as approved by the Division if State Architect

2.02 RESTRAINT CHANNEL BRACINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.; a division of Cooper Industries.

2. Hilti, Inc.

3. Mason Industries, Inc.

4. Unistrut; an Atkore International company.

B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end, with other matching components, and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.03 RESTRAINT CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kinetics Noise Control, Inc.

2. Loos & Co., Inc.

3. Vibration Mountings & Controls, Inc.

B. Restraint Cables: ASTM A 603 galvanized/ASTM A 492 stainless - steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.04 SEISMIC-RESTRAINT ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.; a division of Cooper Industries.

2. Kinetics Noise Control, Inc.

3. Mason Industries, Inc.

4. TOLCO; a brand of NIBCO INC.

B. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections/Reinforcing steel angle clamped] to hanger rod.

C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.

D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings and matched to type and size of anchor bolts and studs.

E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings and matched to type and size of attachment devices used.

F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.05 MECHANICAL ANCHOR BOLTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.; a division of Cooper Industries.

2. Hilti, Inc.

3. Kinetics Noise Control, Inc.

4. Mason Industries, Inc.

B. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.06 ADHESIVE ANCHOR BOLTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hilti, Inc.

2. Kinetics Noise Control, Inc.

3. Mason Industries, Inc.

B. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.01 APPLICATIONS

A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an evaluation service member of ICC-ES/OSHPD/an agency acceptable to authorities having jurisdiction (DSA).

B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods caused by seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.02 SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment and Hanger Restraints:

1. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch

2. Install seismic-restraint devices using methods approved by [an evaluation service member of ICC-ES/OSHPD/an agency acceptable to authorities having jurisdiction (DSA) providing required submittals for component.

B. Install cables so they do not bend across edges of adjacent equipment or building structure.

C. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

E. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.

2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.

3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.

4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.

5. Set anchors to manufacturer's recommended torque using a torque wrench.

6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.03 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where connection is terminated to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.04 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.

2. Test at least four of each type and size of installed anchors and fasteners selected by Architect.

3. Test to 90 percent of rated proof load of device.

B. Seismic controls will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.05 ADJUSTING

A. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION

SECTION 26 05 50

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Cutting and patching for electrical construction.

a. Touchup painting.

1.03 DEFINITIONS

A. GRS: Galvanized Rigid Steel conduit.

B. EMT: Electrical metallic tubing.

C. FMC: Flexible metal conduit.

D. IMC: Intermediate metal conduit.

E. LFMC: Liquid tight flexible metal conduit.

F. RNC: Rigid nonmetallic conduit.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer’s standard product data.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.06 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing equipment and devices requiring positioning prior to start of work.

C. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

D. Where acoustical ceilings and similar finishes will conceal electrical identification markings and devices, coordinate installation of these items provided with the building.

PART 2 - PRODUCTS

2.01 RACEWAYS

A. EMT: ANSI C80.3, zinc-coated steel, with compression fittings.

B. FMC: Zinc-coated steel.

C. GRS: Galvanized Rigid Steel ANSI C80.6, zinc-coated steel, with threaded fittings.

D. LFMC: Zinc-coated steel with sunlight-resistant and mineral-oil-resistant plastic jacket.

E. RNC: NEMA TC 2, Schedule 40 PVC, with NEMA TC3 fittings.

F. Raceway Fittings: Specifically designed for the raceway type with which used compression type.

2.02 CONDUCTORS

A. Conductors, No. 10 AWG and Smaller: Solid or stranded copper 600V rated.

B. Conductors, Larger than No. 10 AWG: Stranded copper 600V rated.

C. Insulation: Thermoplastic, rated at 75 deg C minimum.

D. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.03 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch- diameter slotted holes at a maximum of 2 inches o.c., in webs.

D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.

G. Expansion Anchors: Carbon-steel wedge or sleeve type.

H. Toggle Bolts: All-steel springhead type.

I. Powder-Driven Threaded Studs: Heat-treated steel.

2.04 ELECTRICAL IDENTIFICATION

A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.

B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.

1. Type: Pre-tensioned, wraparound plastic sleeves. Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the item it identifies.
2. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is over laminated with a clear, weather- and chemical-resistant coating.
3. Color: Black letters on orange background.
4. Legend: Indicates voltage.

C. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick

D. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.

E. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.

F. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.

G. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4-inch grommets in corners for mounting.

H. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.05 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.01 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria is not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.02 RACEWAY APPLICATION

A. Use the following raceways for outdoor installations:

1. Exposed: GRS/IMC.
2. Concealed: GRS/IMC.
3. Underground, Single Run: RNC. Schedule 40
4. Underground Grouped: RNC. Schedule 40
5. Boxes and Enclosures: NEMA 250, Type 3R or NEMA Type 1 as specified on drawings.

B. Use the following raceways for indoor installations:

1. Exposed: EMT.
2. Concealed: EMT.
3. Damp or Wet Locations: GRS.
4. Boxes and Enclosures: NEMA 250, Type 1 or 3R as indicated.

3.03 RACEWAY AND CABLE INSTALLATION

A. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors. All exterior exposed conduits shall be GRS type with threaded fittings and Interior spaces shall be EMT type with compression type fittings.

B. Install raceways and cables at least 6 inches away from parallel runs of water pipes. Locate horizontal raceway runs above water piping.

C. Use temporary raceway caps to prevent foreign matter from entering.

D. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

E. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.

F. Transition from nonmetallic tubing to rigid steel conduit before rising above floor/ground.

1. Make bends in exposed parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for exposed parallel raceways. All riser conduits shall be taped with 2 Layers of PVC pipe wrap (2 layers of 10 Mil thickness) to prevent corrosion and puncture resistance.

G. Install pull wires in empty raceways. Use No. 12 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 24 inches of slack at each end of the pull wire.

3.04 WIRING METHODS FOR POWER, LIGHTING, AND CONTROL CIRCUITS

A. Feeders: Type THHN/THWN insulated copper conductors in raceway.

B. Branch Circuits: Type THHN/THWN insulated copper conductors in raceway.

3.05 WIRING INSTALLATION

A. Install splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un spliced conductors.

B. Install wiring at outlets with at least 12 inches of slack conductor at each outlet.

C. Connect outlet and component connections to wiring systems and to ground. Tighten electrical connectors and terminals, according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

D. Lighting Whips

1. The use of MC cable is permitted for lighting installations. The length of the whip shall not exceed 6 feet.

3.06 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp system.

D. Selection of Supports: Comply with manufacturers written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

3.07 SUPPORT INSTALLATION

A. Install support devices to fasten and support electrical components securely and permanently.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Size supports for multiple raceway installations, so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

F. Install 1/4-inch diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Simultaneously install vertical conductor supports with conductors.

J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.

K. Install metal channel racks for mounting cabinets, panel boards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.
2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
3. New Concrete: Concrete inserts with machine screws and bolts.
4. Existing Concrete: Expansion bolts.
5. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
6. Steel: Welded threaded studs or spring-tension clamps on steel.
7. Field Welding: Comply with AWS D1.1.
8. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
9. Light Steel: Sheet-metal screws.
10. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.08 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.

C. Self-Adhesive Identification Products: Clean surfaces before applying.

D. Identify raceways and cables with color banding as follows:

1. Bands: Pre-tensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
3. Colors: As follows:

b. Telecommunication System: Green and yellow.

E. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.

F. Install continuous underground plastic markers during trench backfilling, for exterior underground communication lines located directly above power and communication lines. Locate 6 inches below

finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches overall, use a single line marker.

G. Color-code 208/120-Volt & 277/480-volt system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Black.
2. Phase B: Red.
3. Phase C: Blue.

H. 277/480 Volt

- Brown - phase 1
- Orange - phase 2
- Yellow - phase 3
- Gray or with 2 white stripes -Neutral
- Green with yellow stripe - ground

I. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

J. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch-high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.09 FIRESTOPPING

A. Apply fire stopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Fire stopping materials and installation requirements are as required by UL.

3.10 DEMOLITION

A. Protect existing electrical equipment and installations to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.

B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.

C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.

D. Remove demolished material from Project site.

E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.11 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing fire stopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.12 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Raceways.

2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electrical demolition.
6. Cutting and patching for electrical construction.
7. Touchup painting.

3.13 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.14 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Nameplates and labels.

2. Identification for raceways.

3. Identification of power and control cables.

4. Identification for conductors.

5. Underground-line warning tape.

6. Warning labels and signs.

7. Instruction signs.

8. Equipment identification labels, including arc-flash warning labels.

9. Panel Board Directories.

10. Engraved Device cover plates

11. Miscellaneous identification products.

1.02 APPLICABLE PUBLICATIONS

The following publications form a part of this specification. The publications are referred to in the text by the basic designation only.

A. American National Standards Institute, Inc. (ANSI) Publications:

1. Latest Edition of National Electrical Safety Code with 2016 California Electrical Code (CEC) amendments.

2. Z35.1 Accident Prevention Signs

B. State of California Administrative Code:

1. Title 8, Industrial Relations

C. National Fire Protection Association (NFPA) Publication:

1. 70-2020 National Electrical Code (NEC)

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Delegated-Design Submittal: For arc-flash hazard study.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1and IEEE C2. for minimum size of letters for legend and for minimum length

B. of color field for each raceway size.

C. Comply with NFPA 70.

D. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

E. Comply with ANSI Z535.4 for safety signs and labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.02 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.

2. Legend: Indicate voltage and system or service type.

B. Warning labels and signs shall include, but are not limited to, the following legends:

1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES

2. Provide warning signs or labels for arc flash, and voltages, and others.

2.03 NAMEPLATES

A. Provide laminated plastic nameplates for all electrical equipment and devices including, but not limited to, the following:

1. Enclosures for all separately enclosed devices including but not limited to disconnect switches, circuit breakers, contactors, time switches, control stations and relays.

2. Wall switches not within sight of outlet controlled.

3. Special systems such as but not limited to telephone, warning and signal systems. Iden

tification shall be at each equipment rack, terminal cabinet, control panel, annunciator, and pull box.

4. Devices mounted within and part of an equipment including circuit breakers, switches, control devices, control transformers, relays, indication devices and instruments.

5. Receptacles and lighting switches: Panelboard I.D. and circuit number. These shall be provided with P- Touch or Vinyl labelling.

6. All telecommunication equipment, devices and cabling shall be identified at each location including wiring closets, cabinets, MDF/IDF rooms, Vaults, pull boxes.

B. Nameplate designations shall clearly state:

1. Provide number, location, and letter designation of nameplates as indicated.

2. Manufacturer's nameplate including equipment design rating of current, voltage, KVA, HP, bus bracing rating, or as applicable.

3. Equipment nameplate designating system usage and purpose, system nominal voltage, equipment rating for KVA, amperes, HP and RPM as applicable.

4. Contactors: Voltage, continuous current, horsepower or interrupting current, and whether "mechanically-held" or "electrically-held".

5. Motors: Rated voltage, full load amperes, frequency, phases, speed, horsepower, code letter rating, time rating, type of winding, class and temperature.

6. Controllers: Voltage, current, horsepower, and trip setting of motor running overcurrent protection.

7. Receptacles and lighting switches (wiring devices): Panel designation and circuit number. These shall be provided with P- Touch or Vinyl labelling.

C. Nameplates shall be melamine plastic, 0.125-inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering into the black core. Minimum size of nameplates shall be 1 Inch by 2.5 inches. Lettering shall be normal block style unless otherwise noted.

D. Letter Size:

1. Use 0.25-inch letters for identifying individual equipment and loads.

2. Use 0.50 inch for identifying grouped equipment and loads.

2.04 WIRE MARKERS

A. Description: Tape or tubing type wire markers, 3M Scotch Code or approved equal. Provide markers for each conductor (power and communication systems) at panel board gutters, pull boxes, junction boxes, outlet boxes, and each load connection, MDF, IDF, manholes/vaults/pull boxes.

B. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2. Communication and Signal wiring: Provide wire markers for cables identifying origin and end termination at all equipment, MDF/IDF/Vaults/Pull Boxes etc.

3. Control Circuits: Control wire number indicated on schematic or interconnection diagrams on shop drawings.

2.05 LABELS

A. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Champion America.
c. emedco.
d. LEM Products Inc.
e. Panduit Corp.

B. Self-Adhesive Labels:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. emedco.
c. Ideal Industries, Inc.
d. LEM Products Inc.
e. Panduit Corp.

2. Preprinted, 3-mil- thick, polyester/vinyl flexible label with acrylic pressure-sensitive adhesive.

3. Polyester/Vinyl, thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

a. Nominal Size: 3.5-by-5-inch.

2.06 TAPES AND STENCILS:

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlton Industries, LP.
b. Champion America.
c. Ideal Industries, Inc.
d. Panduit Corp.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Carlton Industries, LP.
c. Emedco.

C. Floor Marking Tape: 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlton Industries, LP.
b. Seton Identification Products.

D. Underground-Line Warning Tape

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Ideal Industries, Inc.
c. LEM Products Inc.
d. Marking Services, Inc.
e. Seton Identification Products.

2. Tape:

a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
b. Printing on tape shall be permanent and shall not be damaged by burial operations.
c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

3. Color and Printing:

a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, , COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

4. Tag: Type I:

a. Pigmented polyolefin, bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
b. Width: 3 inches.
c. Thickness: 4 mils. Weight: 18.5 lb/1000 sq. ft..
d. Tensile according to ASTM D 882: 30 lbf and 2500 psi.

5. Tag: Type ID:

a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
b. Width: 3 inches.
c. Overall Thickness: 5 mils.
d. Foil Core Thickness: 0.35 mil.
e. Weight: 28 lb/1000 sq. ft.
f. Tensile according to ASTM D 882: 70 lbf and 4600 psi.

6. Tag: Type IID:

a. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
b. Width: 3 inches
c. Overall Thickness: 8 mils.
d. Foil Core Thickness: 0.35 mil
e. Weight: 34 lb/1000 sq. ft.
f. Tensile according to ASTM D 882: 300 lbf and 12,500 psi.

2.07 Tags

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Carlton Industries, LP.
c. Emedco.
d. Seton Identification Products.

B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.023 inch thick, color-coded for phase and voltage level, with factory screened permanent designations; punched for use with self-locking cable tie fastener.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Carlton Industries, LP.
c. Emedco.
d. LEM Products Inc.
e. Panduit Corp.

C. Write-On Tags:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlton Industries, LP.
b. LEM Products Inc.

c. Seton Identification Products.

2. Polyester Tags: 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to raceway, conductor, or cable.

3. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

4. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.08 Signs

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.

2. 1/4-inch grommets in corners for mounting.

3. Nominal Size: 7 by 10 inches.

4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlton Industries, LP.
b. Champion America.
c. Emedco.

B. Metal-Backed Butyrate Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing and with colors, legend, and size required for application.

2. 1/4-inch grommets in corners for mounting.

3. Nominal Size: 10 by 14 inches.

4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Champion America.
c. Emedco.

C. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.

2. Thickness:

a. For signs up to 20 sq. inches, minimum 1/16-inch-.
b. For signs larger than 20 sq. inches, 1/8 inch thick.

c. Engraved legend with black letters on white face.

d. Punched or drilled for mechanical fasteners.
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Carlton Industries, LP.
c. Emedco.

2.09 CABLE TIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ideal Industries, Inc.

2. Marking Services, Inc.

3. Panduit Corp.

B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch

2. Tensile Strength at 73 deg F according to ASTM D 638: 12,000 psi

3. Temperature Range: Minus 40 to plus 185 deg F.

4. Color: Black, except where used for color-coding.

C. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 deg F according to ASTM D 638: 12,000 psi.

3. Temperature Range: Minus 40 to plus 185 deg F

4. Color: Black.

D. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.

1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 deg F according to ASTM D 638: 7000 psi.

3. UL 94 Flame Rating: 94V-0.

4. Temperature Range: Minus 50 to plus 284 deg F

5. Color: Black.

2.8 UNDERGROUND LINE WARNING TAPE

A. Tape:

1.Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.

2. Printing on tape shall be permanent and shall not be damaged by burial operations.

3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

E. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

A. Install nameplate parallel to equipment lines. Fasten nameplates to enclosures with a minimum of two sheet-metal screws or two rivets. Fasten nameplates to device plates with suitable adhesive. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.

B. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

E. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

F. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.

2. In Spaces Handling Environmental Air: Plenum rated.

G. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

3.03 IDENTIFICATION SCHEDULE

A. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits, more 120 V to Ground: Identify with self-adhesive vinyl tape applied in bands. Install labels at 10-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."

2. "POWER."

3. "UPS."

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and hand holes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase- and Voltage-Level identification, 600 V or Less: Use industry standard colors for ungrounded service feeders and branch-circuit conductors.

a. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Nameplate Installation:

1. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
2. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
3. Secure nameplate to equipment as recommended by the manufacturer.
4. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
5. Install nameplates for the following with source, end destination, feeder #, voltage, ampacity, feeder wire size for all medium & low voltage (600 volts & below) equipment, Locate equipment labels where accessible and visible:
   a. Switchboards.
   b. Panelboards & Distribution boards.
   c. Transformers.
   d. Service Disconnects.
   f. Motor Control Center.
   g. Manual Transfer Switches
   h. All other equipment installed as part of this project.

E. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive, self-laminating polyester labels/self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.

F. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive, self-laminating polyester labels/self-adhesive vinyl labels with the conductor designation.

G. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

2. Use system of marker-tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

I. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.

2. Install underground-line warning tape for direct-buried cables and cables in raceways.

J. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.

2. Identify system voltage with black letters on an orange background.

3. Apply to exterior of door, cover, or other access.

4. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

a. Power-transfer switches.
b. Controls with external control power connections.

L. Arc Flash Warning Labeling: Self-adhesive thermal transfer vinyl labels.

1. Comply with NFPA 70E and ANSI Z535.4.

2. Comply with Section 260574.19 "Overcurrent Protective Device Arc-Flash Study" requirements for arc-flash warning labels.

M. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

N. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for emergency operations.

O. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.

1. Labeling Instructions:

    a. Indoor Equipment: Engraved, laminated acrylic or melamine plastic label, punched or drilled for mechanical fasteners. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label 4 inches high.
    c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    d. Unless labels are provided with self-adhesive means of attachment, fasten them with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Receptacles and lighting switches (wiring devices): Panel designation and circuit number. These shall be provided with P- Touch or Vinyl labelling.

END OF SECTION

SECTION 26 05 73

OVERCURRENT PROTECTIVE DEVICE ARC-FLASH STUDY

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment. The study must be performed by the equipment manufacture and submitted with equipment submittals.

1.02 ACTION SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Other Action Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form.

1) Arc-flash study input data, including completed computer program input data sheets.

C. Arc-flash study report; signed, dated, and sealed by Power Systems Analysis Specialist employed by manufacturer of equipment or their authorized representative to comply NFPA 70E and its requirements covered under Article 130.5(D) and 130.7 (D) and labeling requirements per NEC 110.16.

1) Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.

1.03 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Arc-Flash Study Software Developer, Arc-Flash Study Specialist and Field Adjusting Agency.

2) For Power Systems Analysis Software Developer.

3) For Power System Analysis Specialist.
4) For Field Adjusting Agency.

B. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance procedures according to requirements in NFPA 70E shall be provided in the equipment manuals.

B. Operation and Maintenance Procedures: Provide maintenance procedures for use by Owner's

personnel that comply with requirements in NFPA 70E.

1.05 QUALITY ASSURANCE

B. Study shall be performed using commercially developed and distributed software designed specifically for power system analysis.
C. Software algorithms shall comply with the requirements of standards and guides specified in this Section.
D. Manual calculations are unacceptable.
E. Power System Analysis Software Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1) Computer program shall be designed to perform arc-flash analysis or have a function, component, or add-on module designed to perform arc-flash analysis.
2) Computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

F. Power Systems Analysis Specialist Qualifications: Professional engineer in charge of performing the arc-flash study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

G. Arc-Flash Study Certification: Arc-Flash Study Report shall be signed and sealed by Power Systems Analysis Specialist.

H. Field Adjusting Agency Qualifications:

1) Employer of a NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification responsible for all field adjusting of the Work.
2) A member company of NETA.
3) Acceptable to authorities having jurisdiction.
4) Manufacturer’s authorized field services.

PART 2 - PRODUCTS

2.01 COMPUTER SOFTWARE DEVELOPERS

A. Software Developers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CGI CYME.
b. EDSA Micro Corporation.
c. ESA Inc.
d. Power Analytics, Corporation.
e. SKM Systems Analysis, Inc.

B. Comply with IEEE 1584 and NFPA 70E.

C. Analytical features of device coordination study computer software program shall have the capability to calculate mandatory features as listed in IEEE 399.

2.02 ARC-FLASH STUDY REPORT CONTENT (To be prepared by Equipment manufacturer or their authorized representative)

A. Executive summary.

B. Study descriptions, purpose, basis and scope.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.

2. Cable size and lengths.

3. Transformer kilovolt ampere (kVA) and voltage ratings.

4. Motor and generator designations and kVA ratings.

5. Switchgear, switchboard, motor-control center and panel board designations.

D. Study Input Data: As described in "Power System Data" Article.

E. Short-Circuit Study Output: As specified in "Short-Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."

F. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."

G. Arc-Flash Study Output Reports:

1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

a. Voltage.
b. Calculated symmetrical fault-current magnitude and angle.
c. Fault-point X/R ratio.
d. No AC Decrement (NACD) ratio.
e. Equivalent impedance.
f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

H. Incident Energy and Flash Protection Boundary Calculations:

5) Arcing fault magnitude.
6) Protective device clearing time.
7) Duration of arc.
8) Arc-flash boundary.
9) Restricted approach boundary.
10) Limited approach boundary.
11) Working distance.
12) Incident energy.
13) Hazard risk category.

14) Recommendations for arc-flash energy reduction.

I. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of computer printout.

2.03 ARC-FLASH WARNING LABELS

A. Comply with requirements of NFPA 70E and its requirements covered under Article 130.5(D) and 130.7 (D) and labeling requirements per NEC 110.16. These shall be provided by the equipment manufacturer's field service personnel including studies & labelling requirement.

B. in Section 260553 "Identification for Electrical Systems" for self-adhesive equipment labels. Produce a 3.5-by-5-inch self-adhesive equipment label for each work location included in the analysis. The labels shall be affixed by equipment manufacturer field engineer after testing & inspection is completed.

C. Label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:

15) Location designation.
16) Nominal voltage.
17) Protection boundaries.

a) Arc-flash boundary.
b) Restricted approach boundary.
c) Limited approach boundary.

18) Arc flash PPE category.
19) Required minimum arc rating of PPE in Cal/cm squared.
20) Available incident energy.
21) Working distance.
22) Engineering report number, revision number, and issue date.

D. Labels shall be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study. All Arc Flash labels shall be installed after acceptance testing by the equipment manufacturer.

3.02 ARC-FLASH HAZARD ANALYSIS

A. Comply with NFPA 70E and its requirements covered under Article 130.5(D) and 130.7 (D) and labeling requirements per NEC 110.16.

I. Preparatory Studies: Perform the **Short-Circuit and Protective Device Coordination studies** prior to starting the Arc-Flash Hazard Analysis.

J. Calculate maximum and minimum contributions of fault-current size.

1) Maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.

2) Calculate arc-flash energy at 85 percent of maximum short-circuit current according to IEEE 1584 recommendations.

3) Calculate arc-flash energy at 38 percent of maximum short-circuit current according to NFPA 70E recommendations.

4) Calculate arc-flash energy with the utility contribution at a minimum and assume no motor contribution.

K. Calculate the arc-flash protection boundary and incident energy at locations in electrical distribution system where personnel could perform work on energized parts.

L. Include low-voltage equipment locations, except equipment rated 240 V ac or less fed from transformers less than 125 kVA.

M. Calculate the limited, restricted, and prohibited approach boundaries for each location.

N. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators shall be decremented as follows:

1) Fault contribution from induction motors shall not be considered beyond three to five cycles.

O. Arc-flash energy shall generally be reported for the maximum of line or load side of a circuit breaker. However, arc-flash computation shall be performed and reported for both line and load side of a circuit breaker as follows:

1) When the circuit breaker is in a separate enclosure.
2) When the line terminals of the circuit breaker are separate from the work location.

P. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

2. POWER SYSTEM DATA

A. Obtain all data necessary for conduct of the arc-flash hazard analysis.

1) Verify completeness of data supplied on one-line diagram on Drawings **and under "Preparatory Studies" Paragraph in "Arc-Flash Hazard Analysis" Article**. Call discrepancies to Architect's attention.
2) For new equipment, use characteristics from approved submittals under provisions of action submittals and information submittals for this Project.

3. LABELING

A. Apply **one** arc-flash label on the front cover **of each section of the equipment and on side or rear covers with accessible live parts and hinged doors or removable plates**] for each equipment included in the study. Base arc-flash label data on highest values calculated at each location.

B. Each piece of equipment listed below shall have an arc-flash label applied to it:

1) Motor-control center.
2) Low-voltage switchboard.
3) Switchgear.
4) Medium-voltage switch.
5) Medium voltage transformers
6) Low voltage transformers.
7) Panelboard and safety switch over 250 V.
8) Applicable panelboard and safety switch under 250 V.
9) Control panel.
10) Medium voltage equipment

C. Note on record Drawings the location of equipment where the personnel could be exposed to arc-flash hazard during their work.

1) Indicate arc-flash energy.
2) Indicate protection level required.

4. APPLICATION OF WARNING LABELS

A. Install arc-flash warning labels under the direct supervision and control of Power System Analysis Specialist.

5. DEMONSTRATION

A. Engage Power Systems Analysis Specialist to train Owner's maintenance personnel in potential arc-flash hazards associated with working on energized equipment and the significance of arc-flash warning labels.

END OF SECTION

SECTION 260943

NETWORK LIGHTING CONTROLS
ACUITY BRANDS-NLIGHT NETWORK CONTROLS

PART 1 – GENERAL

1.0 Section Includes
- A. Network lighting control system and components:
  1. Touch panel controls
  2. Lighting management panels
  3. Lighting management modules
  4. Low voltage wall stations
  5. Power interfaces
  6. Wired sensors

1.1. Related Documents
- A. Section 26 2726 Wiring Devices
- B. Section 26 5119 Interior Lighting
- C. Section 26 5619 Exterior Lighting.

1.2. Summary
- A. The lighting control system specified in this section shall provide time-based, sensor-based (both occupancy and daylight), and manual lighting control
- B. The system shall be capable of turning lighting loads on/off as well as dimming lights (if lighting load is capable of being dimmed0-10V). Specific dimmers will be capable of “dimming lights to off”
- C. All system devices shall be networked together, enabling digital communication between devices, and shall be individually addressed.
- D. The system architecture shall be capable of enabling stand-alone groups (rooms) of devices to function in some default capacity, even if network connectivity to the greater system is lost.
- E. The system architecture shall facilitate remote operation via a computer connection.
- F. The system shall not require any centrally hardwired switching equipment.
- G. The system shall be capable of wireless, wired, or hybrid wireless/wired architectures.
- H. All Interior and Exterior lighting fixtures shall be Controlled by EMS system and programmed as directed by district. Coordinate with EMS installer for specific requirements.

1.3 Submittals
- A. Product Datasheets (general device descriptions, dimensions, electrical specifications, wiring details, nomenclature)
- B. Riser Diagrams – typical per room type (detailed drawings showing device interconnectivity of devices)
- C. Other Diagrams – as needed for special operation or interaction with other system(s)
- D. Example Contractor Startup/Commissioning Worksheet – must be completed prior to factory start-up
- E. Hardware and Software Operation Manuals
- F. Other operational descriptions as needed.
- G. EMS Controls for lighting.

1.4 Project Closeout Documentation
- A. Provide a factory published manual
    1. Warranty
    2. Technical support contact
    3. Electronic manual on manufacturer's website for free download

1.5 Quality Assurance
- A. All steps in sensor manufacturing process shall occur in North America, including population of all electronic components on circuit boards, soldering, programming, wiring, and housing.
- B. All components and the manufacturing facility where product were manufactured must be RoHS compliant.
- C. In high humidity or cold environments, the sensors shall be conformably coated and rated for condensing humidity and -40-degree Fahrenheit operation.
- D. All applicable products must be UL / CUL Listed or other acceptable national testing organization.

1.6 Project Conditions
- A. Only install equipment after the following site conditions are maintained:
    1. Ambient Temperature 14 to 105 degrees F (-10 to 40 degrees C)
    2. Relative Humidity less than 90% non-condensing
- B. Standard electrical enclosures are permanently installed
- C. Equipment is protected from dust, debris and moisture

1.7 Warranty
- A. Five (5) year 100% parts replacement & labor per contract documents.

1.8 Maintenance & Sustainability
- A. Provide new parts, upgrades, and/or replacements available for a minimum of 5 years available to the end user
- B. Provide free telephone technical support

PART 2 – PRODUCTS

2.1 Manufacturers
- A. Acceptable: Acuity Brands Lighting, Inc. – System: nLight by Acuity Controls (District Standards)
- B. Basis of controls design Manufacturer: **Acuity Brands, One Lithonia Way, Conyers GA 30012, www.acuitycontrols.com**
- C. Substitutions: Not Permitted {(District Standards)}:

2.2 System Requirements
- A. System shall have an architecture that is based upon three main concepts: 1) intelligent lighting control devices 2) standalone lighting control zones 3) network backbone for remote or time-based operation.
- B. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photocell sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these components into a single device enclosure should be permissible so as to minimize overall device count of system.
- C. System must interface directly with intelligent LED luminaires such that only CAT-5 cabling is required to interconnect luminaires with control components such as sensors and switches.

D. Intelligent lighting control devices shall communicate digitally, require <7 mA of current to function (Graphic wall stations excluded), and possess RJ-45 style connectors.
E. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher-level network backbone.
F. Devices within a lighting control zone shall be connected with CAT-5e low voltage cabling in any order.
G. Lighting control zone shall be capable of automatically configuring itself for default operation without any start-up labor required.
H. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.
I. Power for devices within a lighting control zone shall come from either resident devices already present for switching (relay device) or dimming purposes, controls enabled luminaires, or from the network backbone. Standalone “bus power supplies” shall not be required in all cases.
J. All switching and dimming for a specific lighting zone shall take place within the devices located in the zone itself (i.e. not in remotely located devices such as panels) to facilitate system robustness and minimize wiring requirements. Specific applications that require centralized or remote switching shall be capable of being accommodated.
K. System shall have one or more primary wall mounted network control “gateway” devices that are capable of accessing and controlling connected system devices and linking into an Ethernet LAN.
L. System shall use “bridge” devices that route communication and distribute power for up to 8 directly connected lighting zones together for purposes of decreasing system wiring requirements.
M. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control schedules and profiles.
N. Individual lighting zones shall be capable of being segmented into several “local” channels of occupancy, photocell, and switch functionality for more advanced configurations and sequences of operation.

2.3 Individual Device Specifications

A. Control module (gateway)
    1. Control module shall be a device that facilitates communication and time-based control of downstream network devices and linking into an Ethernet network.
    2. Devices shall have a user interface that is capable of wall mounting, powered by low voltage, and have a touch screen.
    3. Control device shall have three RJ-45 ports for connection to the graphic touch screen, other backbone devices bridges) or directly to lighting control devices(up to 128 per port).
    4. Device shall automatically detect all devices downstream of it.
    5. Device shall have a standard and astronomical internal time clock.
    6. Device shall have one RJ-45 10/100 BaseT Ethernet connection.
    7. Device shall have a USB port
    8. Each control gateway device shall be capable of linking 1500 devices to the management software, with reduced memory version capable of support up to 400 devices.
    9. Device shall be capable of using a dedicated static or DHCP assigned IP address.
    10. Network Control Gateway device shall be the following nLight model Series:

nECY MVOLT ENC

B. Networked system occupancy sensors
    1. Occupancy sensors shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.
    2. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional “dual” technology shall be used.
    3. Dual technology sensors shall have one of its two technologies not require motion to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT) which both looks for occupant motion and listens for sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) shall not be acceptable.
    4. All sensing technologies shall be acoustically passive, meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonics technology. Ultrasonic or Microwave based sensing technologies shall not be accepted.
    5. Sensors shall be available with zero or one integrated dry contact switching relays, capable of switching 1 amp at 24 VAC/VDC (resistive only).
    6. Sensors shall be available with one or two occupancy “poles”, each of which provides a programmable time delay.
    7. Sensors shall be available in multiple lens options which are customized for specific applications.
    8. Communication and Class 2 low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.
    9. All sensors shall have two RJ-45 ports or capable of utilizing a splitter.
    10. All sensors shall have the ability to detect when it is not receiving valid communication (via CAT-5 connections) and blink its LED in a pattern to visually indicate of a potential wiring issue
    11. Every sensor parameter shall be available and configurable remotely from the software and locally via the device push-button.
    12. Sensors shall be able to function together with other sensors in order to provide expanded coverage areas by simply daisy-chain wiring together the units with CAT-5 cabling.
    13. Sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements.
    14. Wall switch sensors shall recess into single-gang switch box and fit a standard GFI opening.
    15. Wall switch sensors must meet NEC grounding requirements by providing a dedicated ground connection and grounding to mounting strap. Line and load wire connections shall be interchangeable. Sensor shall not allow current to pass to the load when sensor is in the unoccupied (Off) condition.
    16. Wall switch sensors shall have optional features for photocell/daylight override, and low temperature/high humidity operation.
    17. Wall switch sensors shall be available in four standard colors (Ivory, White, Light Almond, Gray)

18. Wall switch sensors shall be available with optional raise/lower dimming adjustment controls.
19. Wall switch sensors shall be the following nLight model numbers, with device color and optional features as specified:

    nWSX PDT LV DX (Dual Tech, No Relay, Raise/Lower Dim Ctrl)

20. Network system shall also have ceiling, fixture, recessed, & corner mounted sensors available.
21. Sensors shall have optional features for photocell/daylight override, dimming control, and low temperature/high humidity operation.
22. Sensors shall be the following nLight model numbers, with device options as specified:

Model # Series	Occupancy Poles	# of Relays	Lens Type	Detection Technology
nCM PDT 9 RJB	1	-	Standard	Dual
nCM 10 RJB	1	-	Extended	PIR

C. Networked system daylight (photocell and/or dimming) sensors
   1. Photocell shall provide for an on/off set-point, and a dead-band to prevent the artificial light from cycling. Delay shall be incorporated into the photocell to prevent rapid response to passing clouds.
   2. Photocell and dimming sensor's set-point and dead-band shall be automatically calibrated through the sensor's microprocessor by initiating an "Automatic Set-point Programming" procedure. Min and max dim settings as well as set-point may be manually entered.
   3. Dead-band setting shall be verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
   4. Photocell and dimming sensors shall be equipped with an automatic override for100 hour burn-in of lamps. This feature must be available at any time for lamp replacements. (Note: This function should be performed prior to any dimming of the lamps including the "auto set-point" setting.)
   5. Combination units that have all features of on/off photocell and dimming sensors shall also be available.
   6. A dual zone option shall be available for On/Off Photocell, Automatic Dimming Control Photocell, or Combination units. The second zone shall be capable of being controlled as an "offset" from the primary zone.
   7. Sensor shall be the following nLight model numbers, with device options as specified:

      nCM(B) ADCX (RJB) (remote automatic dimming control photocell)

D. Networked System Power (Relay) Packs

1. Power Packs shall incorporate one Class 1 relay, a 0-10 VDC dimming output, and contribute low voltage power to the rest of the system. Secondary Packs shall incorporate the relay and 0-10 VDC or line voltage dimming output but shall not be required to contribute system power. Power Supplies shall provide system power only but are not required to switch line voltage circuit. Auxiliary Relay Packs shall switch low voltage circuits only.
2. Power Packs shall accept 120 or 277 VAC, be plenum rated, and provide Class 2 power to the system.
3. All devices shall have two RJ-45 ports.
4. Every Power Pack parameter shall be available and configurable remotely from the software and locally via the device push-button.
5. Power Pack shall securely mount to junction location through a threaded ½ inch chase nipple or be capable of being secured within a luminaire ballast channel. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.
6. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.
7. Power Packs and Power Supplies shall be available that are WiFi enabled.
8. Power Packs (Secondary) shall be available that provide up to 16 Amp switching of all lighting load types.
9. Power Packs shall be available that provide up to 5 Amps switching of all lighting load types as well as 0-10 VDC dimming or fluorescent ballasts/LED drivers.
10. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120 VAC incandescent lighting loads or 120/277 VAC line voltage dimmable fluorescent ballasts (2-wire and 3-wire versions).
11. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120/277 VAC magnetic low voltage transformers.
12. Specific Secondary Packs shall be available that provide up to 4 Amps of switching and can dim 120 VAC electronic low voltage transformers.
13. Specific Power/Secondary Packs shall be available that are UL924 listed for switching of Emergency Power circuits.
14. Specific Secondary Packs shall be available that control louver/damper motors for skylights.
15. Specific Secondary Packs shall be available that provide a pulse on/pulse off signal for purposes of controlling shade systems via relay inputs.
16. Power (Secondary) Packs shall be available that provide up to 20 Amps switching of general purposed receptacle (plug-load) control.
17. Power (Relay) Packs and Supplies shall be the following nLight model numbers:
    nPP16 (Power Pack w/ 16A relay)
    nPP16 D (Power Pack w/ 16A relay and 0-10VDC dimming output)
    nPP16 D ER UL924 Listed Secondary Pack w/ 16A relay and 0-10VDC dimming output for switching/dimming emergency power circuits)

E. Networked System Wall Switches & Dimmers

1. Devices shall recess into single-gang switch box and fit a standard GFI opening.
2. Communication and low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.
3. All devices shall have two RJ-45 ports.
4. All devices shall provide toggle switch control. Dimming control and low temperature/high humidity operation are available options.
5. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).
6. Devices with mechanical pushbuttons shall provide tactile and LED user feedback.
7. Devices with mechanical pushbuttons shall be made available with custom button labeling
8. Devices with a single “on” button shall be capable of selecting all possible lighting combinations for a bi-level lighting zone such that the user confusion as to which of two buttons (as is present in multi-button scenarios) controls which load is eliminated.
9. Wall switches & dimmers shall be the following nLight model numbers, with device options as specified:

   nPODM (single on/off, pushbuttons, LED green indicator light, user feedback)

   nPODM DX (single on/off, single dimming raise/lower, pushbuttons, LED green indicator light, LED user feedback)

F. Communication Bridges

1. Device shall surface mount to a standard 4” x 4” square junction box.
2. Device shall have 8 RJ-45 ports.
3. Device shall be capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to Control Gateway.
4. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply or delivered via a CAT-5 cabled connection.
5. Device shall be capable of redistributing power from its local supply and connect lighting control zones with excess power to lighting control zones with insufficient local power. This architecture also enables loss of power to a particular area to be less impactful on network lighting control system.
6. Communication Bridge devices shall be the following nLight model numbers:

   nBRG 8 (8 Ports)

2.4. Lighting Control Profiles

A. Changes to the operation of the system shall be capable of being made in real-time or scheduled via lighting control profiles. These profiles are outlines of settings that direct how a collection of devices function for a defined time period.

B. Lighting control profiles shall be capable of being created and applied to a single device, zone of devices, or customized group of zones.

C. All relays and dimming outputs shall be capable of being scheduled to track or ignore information regarding occupancy, daylight, and local user switches via lighting control profiles.

D. Specific device parameters (e.g. sensor time delay and photocell set-point) shall be configurable via a lighting control profile.

E. All lighting control profiles shall be stored on the network control gateway device, with a system backup on the software’s host server.

F. Lighting control profiles shall be capable of being scheduled to run according to the following calendar options: start date/hour/minute, end date/hour/minute, and sunrise/sunset +/- timed offsets.
G. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.
H. Daylight savings time adjustments shall be capable of being performed automatically, if desired.
I. Lighting control profile schedules shall be capable of being given the following recurrence settings: daily, weekday, weekend, weekly, monthly, and yearly.
J. Software shall provide a graphical tool for easily viewing scheduled lighting control profiles.

2.5. Management Software

A. Every device parameter (e.g., sensor time delay and photocell set-point) shall be available and configurable remotely from the software and interfaced with building EMS system.
B. The following status monitoring information shall be made available from the software for all devices for which it is applicable: current occupancy status, current PIR Status, current Microphonics Status, remaining occupancy time delay(s), current photocell reading, current photocell inhibiting state, photocell transitions time remaining, current dim level, device temperature, and device relay state(s).
C. The following device identification information shall be made available from the software: model number, model description, serial number, manufacturing date code, custom label(s), and parent network device.
D. A printable network inventory report shall be available via the software.
E. A printable report detailing all system profiles shall be available via the software.
F. Software shall require all users to login with a User Name and Password.
G. Software shall provide at least three permission levels for users.
H. All sensitive stored information and privileged communication by the software shall be encrypted.
I. All device firmware and system software updates must be available for automatic download and installation via the internet.
J. Software shall be capable of managing systems interconnected via a WAN (wide area network)

2.8. Start-up & Support Features

A. To facilitate start-up, all devices daisy-chained together (using CAT-5) shall automatically be grouped together into a functional lighting control zone, controlled by EMS system for Interior and exterior lighting.
B. All lighting control zones shall be able to function according to default settings once adequate power is applied and before any system software is installed and programmed as directed by District.
C. Once software is installed, system shall be able to auto-discover all system devices without requiring any commissioning.
D. All system devices shall be capable of being given user defined names.
E. All devices within the network shall be able to have their firmware upgraded remotely and without being physically uninstalled for purposes of upgrading functionality at a later date.
F. All sensor devices shall have the ability to detect improper communication wiring and blink it’s LED in a specific cadence as to alert installation/startup personnel.

END OF SECTION

SECTION 26 22 13
LIGHTING AND DISTRIBUTION ISOLATION TRANSFORMERS

PART 1 GENERAL

1.01.1 SECTION INCLUDES

A. Dry-type energy efficient transformers per NEMA TP1, with primary and secondary voltages of 600V and less and capacity ratings 15kVA through 750kVA.

1.01.2 REFERENCES

A. NFPA 70 - National Electrical Code
B. NEMA ST20
C. UL 1561
D. NEMA TP1
E. NEMA TP2

1.01.3 SUBMITTALS

A. Suppliers asking consideration as an approved equal shall submit complete, warranted performance data and physical dimensions for similar transformers. Data shall be submitted for each size specified and shall be received by the Architect/engineer no less than 10 days prior to the bid due date for consideration.

B. Shall Include the following

1. Copy of ISO 9001:2000 Certification of manufacturing operation.

2. Copy of ISO 14001:2004 Certification of manufacturing operation.

3. Confirmation that transformer(s) are UL 1561 Listed with a K-9 Rating or other K-Ratings as indicated on the single line diagram.

4. Construction Details including enclosure dimensions, kVA rating, primary & secondary nominal voltages, voltage tap, unit weight.

    a. Wire Access Points – showing Wire Bending Dimensions

    b. Location for Ground Lug Provisions – NEC/CEC

5. Basic Performance characteristics including insulation class, temperature rise, core and coil materials, impedances & audible noise level, unit weight, inrush data RMS.

6. Efficiency Data

7. No load and full load losses will be calculated per NEMA ST20 test methods.

8. Efficiency Curves

   a. Linear Loads

   b. Data per the non-linear load test program.

1.01.4 STANDARDS

A. Transformers 750kVA and smaller shall be listed by Underwriters Laboratories.
B. Conform to the requirements of ANSI/NFPA 70.
C. Transformers are to be manufactured and tested in accordance with NEMA ST20.
D. Transformers losses shall conform to NEMA TP1 requirements
E. Transformers losses shall be tested in accord with NEMA TP2 procedures
F. Seismic Standards California Building Code (CBC), 2019 Edition Tri-axial shake table test results conducted in accordance with the AC156 test protocol3 (Acceptance Criteria for Seismic Qualification Testing of Non-structural Components).
G. International Standards Organization (ISO). ISO 9001:2000 – Quality Management System. ISO 14001:2004 – Environmental Management System.

1.01.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.01.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member Company of NETA or an NRTL.

1.. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.01.7 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions.

1.01.7 Warranty

Manufacturer shall warrant specified equipment to be free from defects in materials and workmanship for twelve (12) months of service not to exceed eighteen (18) months from the date of shipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Transformers shall be as manufactured by Square D Company or approved equal.

B. Approved manufacturers shall be registered firms in accordance with ISO 9001:1994 SIC 3612 (US); which is the design and manufacture of low voltage dry type power, distribution, and specialty transformers.

2.02 RATINGS INFORMATION

A. All insulating materials are to exceed NEMA ST20 standards and be rated for 220°C UL component recognized insulation system.

B. Transformers 15kVA and larger shall be 150°C temperature rise above 40°C ambient. Transformers shall have a minimum of 4 - 2.5% full capacity primary taps. Exact voltages and taps to be as designated on the plans or the transformer schedule.

C. The maximum temperature of the top of the enclosure shall not exceed 50°C rise above a 40°C ambient.

D. Transformers shall be low loss type with minimum efficiencies per NEMA TP1 when operated at 35% of full load capacity. Efficiency shall be tested in accord with NEMA TP2.

Single Phase		Three Phase	
kVA	Efficiency	kVA	Efficiency
15	97.7%	15	97.0%
25	98.0%	30	97.5%
37.5	98.2%	45	97.7%
50	98.3%	75	98.0%
75	98.5%	112.5	98.2%
100	98.6%	150	98.3%
167	98.7%	225	98.5%
250	98.8%	300	98.6%
333	98.9%	500	98.7%
		750	98.8%

E. The transformer(s) shall be rated as indicated in the following schedule:

Identification Number(s)
kVA Rating
Voltages
Phase
Frequency

2.03 CONSTRUCTION

A. Transformer coils shall be of the continuous wound construction and shall be impregnated with non-hygroscopic, thermosetting varnish

B. All cores to be constructed with low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point to prevent core overheating. Cores for transformers greater than 500kVA shall be clamped utilizing insulated bolts

through the core laminations to ensure proper pressure throughout the length of the core. The completed core and coil shall be bolted to the base of the enclosure but isolated by means of rubber vibration-absorbing mounts. There shall be no metal-to-metal contact between the core and coil and the enclosure except for a flexible safety ground strap. Sound isolation systems requiring the complete removal of all fastening devices will not be acceptable.

C. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable UL and NEC standards.

D. The transformer enclosures shall be ventilated and be fabricated of heavy gauge, sheet steel construction The entire enclosure shall be finished utilizing a continuous process consisting of degreasing, cleaning, and phosphatizing, followed by electrostatic deposition of polymer polyester powder coating and baking cycle to provide uniform coating of all edges and surfaces. The coating shall be UL recognized for outdoor use. The coating color shall be ANSI 49.

1. Minimum Clearance from Rear and Sides ½”

E. Transformer coils shall be copper wound.

F. K- Factor for the transformer shall not exceed 13

G. Isolation Transformer Primary windings: 208 volt and Secondary windings 120/208-volt 3 phase 4 wire.

H. Transformers shall be compliant with the Seismic requirements of ASCE/SEI and shall be certified to ICS ES AC 156 by Shake Table qualification testing. The enclosure above is 25J for 225KVA and 21K for 75 KVA transformer

2.04 SOUND LEVELS

A. Sound levels shall be warranted by the manufacturer not to exceed the following:
75 KVA 47DB; 225 KVA 49 DB

2.05 IDENTIFICATION DEVICES

A. Nameplates: Engraved, laminated-plastic or metal nameplate for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

PART 3 EXECUTION

3.01 INSTALLATION

A. Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.

B. Environment: Enclosures shall be rated for the environment in which they are located. Covers for NEMA 250..

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Construct concrete bases/equipment pads per structural details and calculations provided and anchor floor-mounted transformers according to manufacturer's written instructions, seismic codes applicable to Project, and requirements in Section 260529 "Hangers and Supports for Electrical Systems."

1. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

E. Secure transformer to concrete base according to manufacturer's written instructions.

F. Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.

G. Remove shipping bolts, blocking, and wedges.

3.02 CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

D. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

3.03 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS for dry-type, air-cooled, low-voltage transformers. Certify compliance with test parameters.

B. Remove and replace units that do not pass tests or inspections and retest as specified above.

C. Infrared Scanning: Two months after Substantial Completion, perform an infrared scan of transformer connections.

1. Use an infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.

2. Perform two follow-up infrared scans of transformers, one at four months and the other at 11 months after Substantial Completion.

3. Prepare a certified report identifying transformer checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.

3.04 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Output Settings Report: Prepare written report recording output voltages and tap settings.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain and to use

END OF SECTION

SECTION 26 24 13

SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, configuration, and installation for low voltage switchboards (also identified as SWBDs) as required for the complete performance of the Work, as shown on the Drawings, as specified herein.

B. Related Sections: Related sections include, but shall not be limited to, the following:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

2. Applicable general requirements for electrical Work specified within Division 26 Specification Sections apply to this Section.

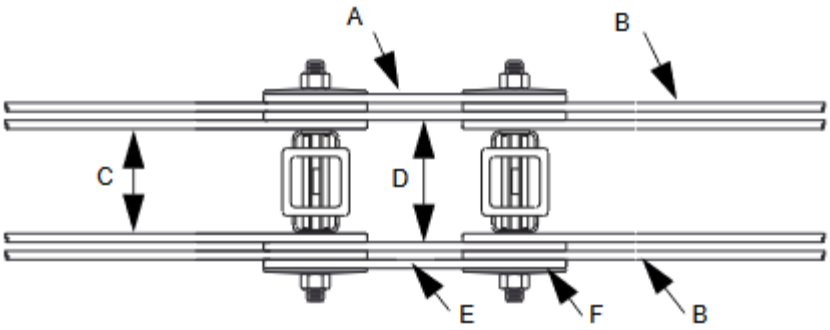
3. The following SWBD information is typically depicted on the Drawings: bus configuration, bus ratings, interrupting ratings, component size and type, power line and feeder connections, application specific control wiring, elevation, and footprint, etc. Where not shown on or able to be derived from the Drawings, the minimum requirements specified herein shall be provided.

1.2 SCOPE

A. Replace existing main 2500-amp (obsolete Square PXF 362500PI electronic trip with 2500-amp sensor breaker – Plant code 45; Cat/Dwg no. 15088342-001 power style QED switchboard – 120/208-volt 3 phase 4 wire NEMA 3R) with current model Square D 2500-amp PowerPact Type R frame molded case circuit breaker rated at 65 KAIC with Micrologic trip unit with busbar connection line and load side of the switchgear. This will require scheduled SCE shut down during replacement and cable terminations - line side feed from SCE transformer, Breaker shall be tested per manufacturer and NETA testing requirements.

B. Provide 2500-amp Bus extension from existing main switchboard for addition of new 1600-amp section with main feeder breaker:

a. QED-2 Switchboard Thru-Bus Splice Connections (Straight) rated to match existing 2500 amps horizontal bus. Level and align adjacent shipping
sections with one another. Ensure proper alignment of horizontal main thru-bus and proper splice bus connections.
b. Switchboard frames must be bolted together before completing the thru-bus splicing. Refer to the appropriate Square D instruction bulletin for
for the switchboard.
c. After bolting the switchboards together, continue with installation for: Bus Bars Thru Bus Connections (Straight)" per figure below, follow manufacturer's installation instructions including torquing values.



A. Rear splice connector.
B. Outside thru – bus
C. Inside thru bus
D. Inside splice connector
E. Front splice connector.
F. Install all spring washers with side marked “Top” away from the thru bus bars and the nuts on the rear splice up to the connector.
G. Laminations must be flush during assembly to provide proper Thru- Bus spacing.

C. Provide new NEMA 3 R Square D distribution section with 2500 amps horizontal bus connected to new bus extension and 1600-amp 3p 100 % rated electronic breaker 65 KAIC rated distribution feeder breaker for new PAC. The new distribution section shall match exiting switchgear line up.

1.3 REFERENCES

A. General, Publications: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

1. ASTM (ASTM):
   a. ASTM E 329 "Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction."
2. Federal Specifications (FS):
   a. FS W C 375 "Circuit Breakers, Molded Case, Branch Circuit and Service."
3. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   a. ANSI/IEEE C57.13 "Standard Requirements for Instrument Transformers".
4. International Electrical Testing Association (NETA):
   a. NETA ATS "Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems."
5. International Organization for Standardization (ISO)
   a. ISO 9001 “Quality Management Systems - Requirements”
   b. ISO 14001 “Environmental Management Systems – Requirements”
6. National Electrical Contractors Association (NECA):
   a. NECA 400 “Standard for Installing and Maintaining Switchboards"
7. National Electrical Manufacturers Association (NEMA):
   a. NEMA EI 21.1 "Instrument Transformers for Revenue Metering (110 kV BIL and Less).”
   b. NEMA KS 1 "Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)"
   c. NEMA PB 2 "Deadfront Distribution Switchboards."

d. NEMA PB 2.1 "General Instructions for Proper Handling, Installation, Operation and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less."

8. National Fire Protection Agency (NFPA)
   a. NFPA 70 “National Electrical Code (NEC)”
   b. NFPA 70B “Electrical Equipment Maintenance”
   c. NFPA 70E “Standard for Electrical Safety in the Workplace”
9. Underwriters Laboratories, Inc. (UL)
   a. UL 98 "Enclosed and Dead Front Switches"
   b. UL 489 "Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures."
   c. UL 891 "Switchboards"
   d. UL 1283 “Standard for Electro Magnetic Interference Filters"
   e. UL 1449 "Surge Protective Devices"

1.4 DEFINITIONS

A. Unless specifically defined within the Contract Documents, the words or acronyms contained within this specification shall be as defined within, or by the references listed within this specification, the Contract Documents, or, if not listed by either, by common industry practice.
   1. 3P4W: 3 phase 4 wire, numbers may change
   2. SPD: Surge Protective Devices

1.5 SUBMITTALS

A. General: Submittals shall be in accordance with the requirements of Section 01 33 00 Submittals and Division 26 Electrical Requirements, in addition to those specified herein.
   1. Submit sufficient information to determine compliance with the Contract Documents. Identify submittal data with the specific equipment tags and/or service descriptions to which they pertain. Submittal data shall be clearly marked to identify the specific model numbers, options, and features of equipment and work proposed.
   2. Deviations from the Contract Documents shall be indicated within the submittal. Each deviation shall reference the corresponding drawing or specification number, show the Contract Document requirement text and/or illustration, and shall be accompanied by a detailed written justification for the deviation.
   3. Submit required product data and shop drawings specific to each product and accessory proposed. In addition, include the following information, including dimensions and manufacturer’s technical data on features, performance, ratings and finishes:
      a. Each type of SWBD overcurrent protective device
      b. Surge Protective Devices
      c. Ground Fault Protectors
      d. Additional accessories and components indicated herein.
      e. Indicate front and side enclosure elevations with overall dimensions, conduit entrance locations and requirements, nameplate legends, one-line diagrams, equipment schedule and switchboard instrument details.
      f. Submit mimic bus diagram.

B. Operation & Maintenance (O&M) manuals shall be provided in accordance with the minimum requirements specified in contract documents. Operation and Maintenance Data, Electrical Requirements and additional requirements specified herein.
   1. Submit required Operations & Maintenance data specific to each product and accessory proposed. In addition, include the following information:

a. Manufacturer, supplier, support, and repair center specific contact information.

b. Manufacturer's standard operation and maintenance data assembled for each size and type of equipment furnished.

c. All construction, installation, schematic, and wiring diagrams updated to an as installed and commissioned state

d. All configured settings/parameters for adjustable components updated to an as installed and commissioned stated if different from the factory default. Electronic copies of configuration files shall be provided, on media acceptable to the district (e.g., CD, USB stick, etc.), where these configurations can be saved as an electronic file for future upload into replaced or repaired components.

e. List of furnished and recommended spare parts.

f. Statement of standard Warranty.

g. Final Assembly and Testing Report

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of specified products of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of twenty years.

1. The manufacturer shall have a valid ISO 9001 certification and an applicable quality assurance system that is regularly reviewed and audited by a third-party registrar. Manufacturing, inspection, and testing procedures shall be developed and controlled under the guidelines of the quality assurance system.

2. The manufacturer or their representative shall have service, repair, and technical support services available 24 hours 7 days a week basis.

3. The manufacturer shall have the ISO 14001 Environment Certification and shall supply the Product Environmental Profile (P.E.P.) upon request of the Engineer.

B. Installer Qualifications: Installer shall be a firm that shall have a minimum of (10) Ten years of successful installation experience with projects utilizing equipment similar in type and scope to that required for this Project [and shall be approved by the manufacturer's representative].

C. All work performed and all materials used shall be in accordance with the National Electrical Code, California Electrical Code and with applicable local regulations and ordinances. Equipment assemblies, materials, and equipment shall be listed and labeled by Underwriter's Laboratories or by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

1.7 DELIVERY, STORAGE AND HANDLING

A. Prior to delivery to the Project site, ensure that suitable storage space is available to store materials in a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, and corrosive atmospheres. Materials shall be protected during delivery and storage and shall not exceed the manufacturer stated storage requirements. As a minimum, store indoors in clean, dry space with uniform temperature to prevent condensation. In addition, protect electronics from all forms of electrical and magnetic energy that could reasonably cause damage.

B. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and equipment tag number or service name as identified within the Contract Documents.

C. Inspect and report any concealed damage or violation of delivery storage, and handling requirements to the Engineer.

1.8 WARRANTY

A. General: Refer to Division 1

B. The manufacturer shall warrant products against defects in material and workmanship for 24 months from the date of commissioning or 36 months from the date of shipment, whichever comes first, provided that the manufacturer performs functional testing, commissioning and first parameter adjusting of equipment. During the warranty period the manufacturer shall repair or replace defective products. This warranty shall be in addition to any provided by the Contractor. The warranty shall exclude normal wear and tear under normal usage and any damage caused by abuse, modification, or improper maintenance by entities other than the manufacturer or its approved representative.

C. Additional Owner Rights: The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Square D QED-2 or FlexSeT Switchboards by Schneider Electric.

B. Acceptable Products: Products specified herein shall be the product of a single manufacturer. Products and manufacturers specified are to establish a standard of quality for design, function, materials, and appearance. Products shall be modified as necessary by the manufacturer for compliance with requirements. Provide the following specified product and manufacturer without exception, unless allowed as a substitute by addendum to the Contract Documents prior to the bid date:

1. QED-2 or FlexSeT Switchboards by Schneider Electric

2.2 GENERAL REQUIREMENTS

A. The following SWBD information is typically depicted on the Drawings: bus configuration, bus ratings, interrupting ratings, component size and type, power line and feeder connections, application specific control wiring, elevation and footprint, etc. Where not shown on or able to be derived from the Drawings, the minimum requirements specified herein shall be provided.

B. Switchboards shall conform to UL891 with a nominal system voltage of **208Y/120 volts** at 60Hz.

C. System ampacity shall be **1600A with main**. All horizontal bus shall be continuously rated to the full ampacity of the system.

D. Short Circuit Current Rating shall be **65 kA** RMS.

E. Switchboards shall consist of a lineup of the following section types as specified herein or shown on the drawings:

1. Main Section

F. Enclosures shall be NEMA Type 3R/NEMA 1 as indicated on the drawings. Switchboard sections shall all be front accessible and rear aligned with the adjacent sections.

G. Enclosure shall be steel with a factory-applied finish in the manufacturer's standard paint color over a rust-inhibiting primer on treated metal surface. Bus transition and incoming pull sections shall match and align with adjacent sections. Barriers shall be provided between adjacent switchboard sections. Front covers shall be removable with a single tool. All doors shall be hinged with removable hinge pins.

H. Bussing shall be of sufficient cross-sectional area to meet UL 891 temperature rise requirements. Bus shall be constructed of **hard drawn silver-plated copper of 98 percent conductivity.** Plating shall be applied over all bus surface except cut edges, bus plating on contact surfaces only shall not be acceptable.

1. The phase and neutral horizontal bus shall have an ampacity equal to or greater than the switchboard system rating. Tapered bus shall not be permitted. Full provisions for the addition of future sections shall be provided. Bussing shall include, but shall not be limited to, necessary hardware to accommodate splicing for future additions.

2. Group Mounted Feeder Vertical Bus Stack:

   a. Bus stack shall be capable of mounting feeder breakers with different frame sizes and number of poles across from one another on the bus stack.

   b. Non-conducting surface films shall be removed during circuit breaker installation by a wiping action of the circuit breaker jaws.

   c. The design of the circuit breaker jaws, and bus stack shall create blow on forces under fault conditions.

   d. To minimize maintenance concerns, Bolted connections for feeder breakers shall not be allowed for group mounted feeders.

3. Ground Bus: Ground bus shall be sized per current NEC and UL 891 Tables 28.1 and 28.2, hard drawn copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch circuit ground conductors. For busway feeders, insulated equipment grounding cable shall be extended to busway ground connection and the cable supported at intervals in vertical run.

I. Termination lugs shall be UL Listed to accept solid or stranded copper conductors. Termination lugs shall be suitable for cables sized per the 75C column of the CE Code table. It is permissible for primary cables terminating in a bussed auxiliary section to be sized to the 90C column of the CE Code.

J. Future Devices: Compartments shall be equipped with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit breaker compartment.

2.3 INCOMING

A. Incoming section shall allow for **bottom entry as shown on drawings** of incoming conductors.

B. Provisions for incoming connections shall **be suitable for landing cables as shown on drawings.**

C. Incoming connections shall allow for direct connection to the **line terminals of main overcurrent device.**

D. Where cable terminations are provided for incoming conductors, provide **mechanical/**crimp type compression lugs in quantity and size for conductors shown on drawings. Lugs shall be suitable for use with **copper type shown on drawings.** conductors and shall be rated for 75-degree C.

2.4 MAIN OVERCURRENT PROTECTIVE DEVICES- MICROLOGIC POWERPACT (R FRAME) WITH MICROLOGIC

A. Each overcurrent protective device shall be of one of the following types:
   1. Circuit Breakers 100% rated (Square D Power pact with micrologic.

B. Molded Case Circuit Breakers (MCCBs): (feeder breakers)
   1. MCCBs shall be of standard frame sizes, trip ratings, and number of poles.
   2. Lugs shall be Mechanical style, suitable for number, size, trip ratings, and conductor material.

3. Application Listing shall be appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air conditioning, and refrigerating equipment.

2.5 MARKINGS AND LABELING

A. All identification and warning labels and nameplates exterior to the SWBD shall be resistant to **weather, UV and** their intended installation environment.

B. Each SWBD shall be provided with an engraved nameplate identifying the project specific equipment tag and service description

C. Warning labels and nameplates shall be present at access locations to advise personnel of possible hazards. The SWBD shall be marked in accordance with UL, NFPA 70 NEC, NFPA 70E, and other applicable standards.

D. A QR code on the front face of equipment shall provide access to unique digital record keeping or each switchboard furnished using a maintenance logbook application or website available on PC or smart mobile device. When scanned, the QR code shall provide access to the manufacturer's standard documentation plus unique documents for the furnished equipment such as serial number, as-built drawings, assembly and testing reports, device settings, spare part lists, etc. The logbook shall assist in compliance with NFPA 70B Article 31 and IEC 60634-6. Access shall be provided to the Owner with information protected by username and password.

PART 3 - EXECUTION

3.1 GENERAL

A. In addition to the requirements specified herein, execution shall be in accordance with the requirements of Division 26 specifications and Drawings.

B. Examine equipment exterior and interior prior to installation. Report any damage and do not install any equipment that is structurally, moisture, or mildew damaged.

C. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Engineer, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Check that concrete pads are level and free of irregularities.
2. Installation space is enclosed and weatherproof.
3. Any wet work located in or near switchboard installation location is completed and nominally dry.

D. Pre-Installation Conference: Prior to commencing the installation, an onsite pre-installation conference shall review the material selections, installation procedures, and coordination with other trades. Attendees shall include, but shall not be limited to, the Contractor, the Installer, manufacturer's representatives, and any trade that requires coordination with the work. Date and time of the pre-installation conference shall be acceptable to the Owner and the Engineer

E. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

F. Install equipment in accordance with reviewed product data, final shop drawings, manufacturer's written instructions and recommendations, and as indicated on the Drawings.

G. Provide final protection and maintain conditions in a manner acceptable to the manufacturer that shall help ensure that the equipment is without damage at time of Substantial Completion.

H. Install switchboards and accessories according to NEMA PB 2.1 and NECA 400.

I. Install and anchor switchboards level on raised concrete bases, Concrete base is specified in structural details with concrete materials and installation requirements.

J. Frame and mount the printed basic operating instructions for switchboards, including, but not limited to, control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.

3.2 FIELD TESTING AND COMMISSIONING

A. Operational Readiness Testing

1. The Contractor shall inspect and test furnished equipment and associated systems for conformance to the contract documents, including equipment manufacture's recommendations, and readiness for operation. The test shall include the following as a minimum:

   a. Visually inspect for physical damage and proper installation

   b. Perform tests in accordance with manufacturer's instructions

   c. Perform tests to ensure compliance with Contract Documents

   d. Perform tests that equipment is ready for operation

   e. Touch-up paint all chips and scratches with manufacturer-supplied paint and transfer remaining paint to Owner

   f. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit.

   g. Measure, using a Megger, the insulation resistance of each bus structure phase-to-phase and phase-to-ground for one minute each, at minimum test voltage of 1000 Vdc; minimum acceptable value for insulation resistance is 1 megohms. Refer to manufacturer's literature for specific testing procedures.

   h. Physically test key interlock systems to check for proper functionality prior to energizing.

   i. Test continuity of each circuit.

   j. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Sections 7.1, 7.5, 7.6, 7.9, 7.10, 7.11, and 7.14 as appropriate. Certify compliance with test parameters.

2. Contractor shall submit an operational readiness test report documenting all test results, including all assumptions, conditions, allowances and corrections made during the test. The report shall provide a listing of all modifications and adjustments made onsite to include any settings / parameters not identified as factory defaults within the equipment's O&M documentation. The test report shall include a signed statement from the Contractor, installer(s) and the factory-trained manufacturer's representative(s) certifying that the furnished equipment and associated system have been installed, configured, and tested in accordance with the manufacturer's recommendations, completely conforms to the requirements of the Contract Documents and is ready for operation.

B. Functional Demonstration Testing

1. Prior to scheduling functional demonstration testing the Contractor shall submit a signed statement from the Contractor, installer(s) and the factory-trained manufacturer's representative(s) certifying that the furnished equipment and associated system have been installed, configured, and tested in accordance with the manufacturer's recommendations, completely conforms to the requirements of the Contract Documents and is ready for operation.

2. The Contractor shall completely demonstrate the functionality and performance of the equipment and associated systems in the presence of District and IOR, observing and documenting complete compliance with the Contract Documents.

3. The Contractor shall submit a written report documenting successful completion of functional demonstrating testing including all assumptions, conditions, allowances, and corrections made during the test.

C. Digital documentation of the final as-installed configuration of equipment including manuals, settings, parameters and test reports shall be provided by a maintenance logbook application or website available on PC or smart mobile device. The logbook shall assist in compliance with NFPA 70B Article 31 and IEC 60634-6 for commissioning and documentation of the configuration. Access to the digital documentation as well as the maintenance logbook application or website shall be provided to the Owner.

END OF SECTION

SECTION 26 24 14

I-LINE PANEL AND DISTRIBUTION BOARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Power Distribution Panelboard - Furnish and install distribution panelboard(s) as specified herein and where shown on the associated drawings.

1.02 REFERENCES

The panelboard(s) and circuit breaker(s) referenced herein are designed and manufactured according to the latest revision of the following specifications.

A. NEMA PB 1 - Panelboards

B. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

C. NEMA AB 1 - Molded Case Circuit Breakers

D. UL 50 - Enclosures for Electrical Equipment

E. UL 67 - Panelboards

F. UL 489 - Molded-Case Circuit Breakers and Circuit Breaker Enclosures

G. CSA Standard C22.2 No. 29-M1989 - Panelboards and Enclosed Panelboards

H. CSA Standard C22.2 No. 5-M91 - Molded Case Circuit Breakers

I. Federal Specification W-P-115C - Type I Class 1

J. Federal Specification W-C-375B/Gen - Circuit Breakers, Molded Case, Branch Circuit and Service.

K. Federal Specification W-C-865C - Fusible Switches

L. NFPA 70 - National Electrical Code (NEC)

M. ASTM - American Society of Testing Materials

N. IBC – International Building Code – Seismic compliance requirements

O. NFPA 5000 – NFPA Building Code – Seismic compliance requirements

P. CBC - California Building Code - Seismic compliance requirements

Q. ASCE 7 – American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures – Seismic compliance requirements.

1.03 SUBMITTAL AND RECORD DOCUMENTATION

A. Approval documents shall include drawings. Drawings shall contain overall panelboard dimensions, interior mounting dimensions, and wiring gutter dimensions. The location of the main, branches, and solid neutral shall be clearly shown. In addition, the drawing shall illustrate one-line diagrams with applicable voltage systems.

1.04 QUALIFICATIONS

A. Company specializing in manufacturing of panelboard products with a minimum of fifty (50) years documented experience.

B. Panelboards shall be manufactured in accordance with standards listed Article 1.02 - REFERENCES.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inspect and report concealed damage to carrier within their required time period.

B. Handle carefully to avoid damage to panelboard internal components, enclosure, and finish.

C. Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional heavy canvas or heavy plastic cover to protect enclosure(s) from dirt, water, construction debris, and traffic.

1.06 OPERATIONS AND MAINTENANCE MATERIALS

A. Manufacturer shall provide installation instructions and NEMA Standards Publication PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

B. Manufacturer’s Instruction Bulletin and installation Manual

1.07 WARRANTY

A. Manufacturer shall warrant specified equipment to be free from defects in materials and workmanship for twelve (12) months of service not to exceed eighteen (18) months from the date of shipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Shall be Square D Company I-LINE (DISTRICT STANADARD)

2.02 POWER DISTRIBUTION PANELBOARDS

A. I-LINE Circuit Breaker Distribution Panelboard

1. Interior

a. Shall be Square D I-LINE type rated 600 Vac or 250 Vdc maximum. Continuous main current ratings as indicated on associated schedules and drawings not to exceed 1200 amperes maximum. Panelboard bus current ratings shall be

determined by heat-rise tests conducted in accordance with UL 67.

b. Provide UL Listed short circuit current ratings (SCCR) as indicated on the associated schedules and drawings not to exceed the lowest interrupting capacity rating of any circuit breaker installed with a maximum of 200,000 RMS symmetrical amperes. Main lug and main breaker panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NFPA70 National Electric Code.
c. The panelboard interior shall have three flat bus bars stacked and aligned vertically with glass reinforced polyester insulators laminated between phases. The molded polyester insulators shall support and provide phase isolation to the entire length of bus.
d. The bussing shall be fully rated with sequentially phased branch distribution. Panelboard bussing shall be plated copper. Bus bar plating shall run the entire length of the bus bar. The entire interleaved assembly shall be contained between two (2) U-shaped steel channels, permanently secured to a galvanized steel-mounting pan by fasteners.
e. Interior trim shall be of dead-front construction to shield user from all energized parts. Main circuit breaker and main lug interiors shall be field convertible for top or bottom incoming feed.
f. A solidly bonded copper equipment ground bar shall be provided. [An additional copper isolated/insulated ground bar shall also be provided.]=
g. Solid neutral shall be equipped with a full capacity bonding strap for service entrance applications. UL Listed panelboards with 200% rated solid neutrals shall have plated copper neutral bus for non-linear load applications. Gutter-mounted neutral will not be acceptable.
h. Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label, and Short Circuit Current Rating shall be displayed on the interior or in a booklet format. Leveling provisions shall be provided for flush mounted applications.

2. Group mounted circuit breakers through 1200A

   a. Circuit breaker(s) shall be group mounted with plug-on electrical connection, bolted to common pan or rail assembly.
   b. The interior shall have three flat bus bars stacked and aligned vertically with glass reinforced polyester insulators laminated between phases. The molded polyester insulators shall support and provide phase isolation to the entire length of bus.
   c. Circuit breakers equipped with line terminal jaws shall not require additional external mounting hardware. Circuit breakers shall be held in mounted position by a self-contained bracket secured to the mounting pan by fasteners. Circuit breakers of different frame sizes shall be capable of being mounted across from each other.
   d. Line-side circuit breaker connections are to be jaw type.
   e. All unused spaces provided, unless otherwise specified, shall be fully equipped for future devices, including all appropriate breaker connectors and mounting hardware.

3. Molded Case Circuit Breaker Characteristics - General

   a. Circuit breakers shall be I-LINE - up to 1200 Amp maximum construction with factory installed mechanical lugs. All circuit breakers shall be UL Listed to accept field installable/removable—mechanical type—lugs (except type QB/QD/QG/QJ). All lugs shall be UL Listed to accept solid (not larger than #8 AWG) and/or stranded-copper conductors only. Lugs shall be suitable for 60° C rated wire - on 125 A circuit breakers and below], 75° C rated wire or 90° C rated wire, sized according to the 75° C temperature rating in the National Electrical Code.
   b. Circuit breaker/circuit breaker combinations for series connected interrupting ratings

shall be listed by UL as recognized component combinations. Any series rated combination used shall be marked on the end use equipment along with the statement "Caution - Series Rated System. ____xxxxxx_____ Amps Available. Identical Replacement Component Required".

c. All circuit breakers with permanent trip units shall be UL Listed for reverse connection without restrictive line and load markings and be suitable for mounting in any position.

4. Enclosures

a. Type 1 Boxes

1) Boxes shall be hot zinc dipped galvanized steel constructed in accordance with UL 50 requirements. Unpainted galvannealed steel is not acceptable.
2) Boxes shall have removable blank end walls and interior mounting studs. Interior support bracket shall be provided for ease of interior installation.

b. Type 1 Trim Fronts

1) Trim front steel shall meet strength and rigidity requirements per UL 50 standards. Shall have an ANSI 49 medium gray enamel electrodeposited over cleaned phosphatized steel.
2) Trim front shall be hinged 1-piece with door available in flush/surface mount as indicated on the drawings. Trim front door shall have rounded corners and edges free of burrs. A clear plastic directory cardholder shall be mounted on the inside of the door.
3) Locks shall be cylindrical tumbler type with larger enclosures requiring sliding vault locks with 3-point latching. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock.

c. Type 3R

1) Enclosures shall be constructed in accordance with UL 50 requirements. Enclosures shall be painted with ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
2) All doors shall be gasketed and be equipped with a tumbler type vault lock and two (2) additional quarter turn fasteners. A clear plastic directory cardholder shall be mounted on the inside of door. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install panelboards in accordance with manufacturer's written instructions, NEMA PB 1.1 and NEC standards.

B. Wiring shall be done in an orderly fashion with crisp lines and good connections, torqued to the manufacturer’s required ratings.

3.02 FIELD QUALITY CONTROL

A. Inspect complete installation for physical damage, proper alignment, anchorage, and grounding.

B. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads within 20% of each other. Maintain proper phasing for multi-wire branch circuits.

C. Check tightness of bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written specifications.

3.03 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain and to use

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Lighting and appliance branch-circuit panel boards.

1.02 DEFINITIONS

A. MCCB: Molded-case circuit breaker.

B. SPD: Surge protective device.

1.03 REFERENCES

The panelboard(s) and circuit breaker(s) referenced herein are designed and manufactured according to the latest revision of the following specifications.

A. NEMA PB 1 - Panelboards
B. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
C. NEMA AB 1 - Molded Case Circuit Breakers
D. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
E. UL 50 - Enclosures for Electrical Equipment
F. UL 67 - Panelboards
G. UL 98 - Enclosed and Dead-front Switches
H. UL 489 - Molded-Case Circuit Breakers and Circuit Breaker Enclosures
I. CSA Standard C22.2 No. 29-M1989 - Panelboards and Enclosed Panelboards
J. CSA Standard C22.2 No. 5-M91 - Molded Case Circuit Breakers
K. Federal Specification W-P-115C - Type I Class 1
L. Federal Specification W-C-375B/Gen - Circuit Breakers, Molded Case, Branch Circuit And Service.
M. NFPA 70 - National Electrical Code (NEC)
N. ASTM - American Society of Testing Materials
O. IBC – International Building Code – Seismic compliance requirements
P. NFPA 5000 – NFPA Building Code – Seismic compliance requirements
Q. ASCE 7 – American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures – Seismic compliance requirements
R. ICC ES AC156 – International Code Council Evaluation Services Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems – seismic testing protocol.
S. Manufacturer’s Instruction Bulletin and installation Manual

1.04 ACTION SUBMITTALS

A. Product Data: For each type of panel board.

B. Shop Drawings: For each panel board and related equipment.

1. Include dimensioned plans, elevations, sections, and details.

2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.

3. Detail bus configuration, current, and voltage ratings.

4. Short-circuit current rating of panel boards and overcurrent protective devices.

5. Include evidence of NRTL listing for series rating of installed devices.

6. Include evidence of NRTL listing for SPD as installed in panel board.

7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

8. Include wiring diagrams for power, signal, and control wiring.

9. Key interlock scheme drawing and sequence of operations.

10. Include time-current coordination curves for each type and rating of overcurrent protective device included in panel boards.

1.05 INFORMATIONAL SUBMITTALS

A. Panel board schedules for installation in panel boards.

1.06 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.07 FIELD CONDITIONS

A. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures not exceeding 104º F ..

2. Altitude not exceeding 3300 feet.

1.08 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panel boards that fail in materials or workmanship within specified warranty period.

1. Manufacturer shall warrant specified equipment to be free from defects in materials and workmanship for twelve (12) months of service not to exceed eighteen (18) months from the date of shipment.

PART 2 - PRODUCTS

2.01 PANELBOARDS COMMON REQUIREMENTS

A. Fabricate and test panel boards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

E. Enclosures: Flush and Surface - mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

b. Outdoor Locations: NEMA 250, Type 3R.
c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2. Height: 84 inches maximum with operating device height of 6’7” maximum.

3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.

4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

F. Incoming Mains Location: Convertible between top and bottom.

G. Phase, Neutral, and Ground Buses Hard-drawn copper, 98 percent conductivity.

H. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: =Hard-drawn copper, 98 percent conductivity.

2. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panel board.

3. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panel board.

4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

5. Sub feed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

I. NRTL Label: Panel boards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panel boards shall have meter enclosures, wiring, connections, and other provisions for digital metering. Coordinate with utility company for exact requirements.

J. Future Devices: Panel boards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

K. Panel board Short-Circuit Current Rating: Series and Fully rated to interrupt symmetrical short-

circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.02 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panel boards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

B. Surge Suppression: Factory installed as an integral part of indicated panel boards, complying with UL 1449 SPD Type 1/Type 2 as indicated on the drawings.

2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are limited to the following(District Standard):

1. Square D; by Schneider Electric. NF & NQOD Type:

a. Interior

1) Shall be type NQ or NQOD panelboard rated for 240 Vac/48 Vdc maximum. Continuous main current ratings, as indicated on associated schedules on drawings, not to exceed 600 amperes maximum.
2) Shall be type NF panelboard for 480Y/277 Vac maximum. Continuous main current ratings, as indicated on associated schedules on drawings, not to exceed 600 amperes for main breaker panelboards and not to exceed 800 amperes for main lug panelboards.
3) Minimum short circuit current rating: As indicated on the drawings and obtained from shirt circuit & coordination studies in rms symmetrical amperes at 240 Vac.& 600 Vac
4) Provide one (1) continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors suitable for plug-on or bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67. Bussing shall be plated copper as standard construction. Bus bar plating shall run the entire length of the bus bar. Panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NEC Articles 230-F and -G.
5) All current-carrying parts shall be insulated from ground and phase-to-phase by high dielectric strength thermoplastic.
6) A solidly bonded copper equipment ground bar shall be provided.
7) Split solid neutral shall be plated and located in the mains compartment up to 225 amperes so all incoming neutral cable may be of the same length.
8) Interior trim shall be of dead-front construction to shield user from energized parts. Dead-front trim shall have filler plates covering unused mounting spaces.
9) Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and short circuit current rating shall be displayed on the interior or in a booklet format.
10) Interiors shall be field convertible for top or bottom incoming feed. Main circuit breakers in 100A interiors shall be horizontally/vertically] mounted. Main circuit breakers over 100A shall be vertically mounted. Sub-feed circuit breakers shall

be vertically mounted. Main lug interiors up to 400 amperes shall be field convertible to main breaker. Interior leveling provisions shall be provided for flush mounted applications.

11) Interior phase bus shall be pre-drilled to accommodate field installable options (NQ only), i.e., Sub-Feed Lugs, Sub-Feed Breakers, Thru-Feed Lugs.

2. Main Circuit Breaker:

   a. Shall be Square D type circuit breakers.
   b. Main circuit breakers shall have an over center, trip-free, toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be true rms sensing and be factory calibrated to operate in a 40° C ambient environment. Thermal elements shall be ambient compensating above 40° C.
   c. Two- and three-pole circuit breakers shall have common tripping of all poles. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker that allows the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.
   d. Breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breakers shall be UL Listed for reverse connection without restrictive line or load markings.
   e. Circuit breaker escutcheon shall have international I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the ON or OFF position.
   f. Lugs shall be CSA and UL Listed to accept solid or stranded copper and aluminum conductors. Lugs shall be suitable for 90° C rated wire, sized according to the 75° C temperature rating per NEC Table 310-16. Lug body shall be bolted in place; snap-in designs are not acceptable.
   g. The circuit breakers shall be CSA and UL Listed for use with the following accessories: Shunt Trip, Under Voltage Trip, Ground Fault Shunt Trip, Auxiliary Switch, Alarm Switch, Mechanical Lug Kits, and Compression Lug Kits.

3. Branch Circuit Breakers

   a. Shall be Square D type circuit breakers. Circuit breakers shall be UL Listed with amperage ratings, interrupting ratings, and number of poles as indicated on the associated schedules on drawings.
   b. Molded case branch circuit breakers shall have bolt-on type bus connectors.
   c. Circuit breakers shall have an over center toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two- and three-pole circuit breakers shall have common tripping of all poles.
   d. There shall be two forms of visible trip indication. The breaker handle shall reside in a position between ON and OFF. In addition, there shall be a red VISI-TRIP® indicator appearing in the clear window of the circuit breaker housing.
   e. The exposed faceplates of all branch circuit breakers shall be flush with one another.
   f. Lugs shall be UL Listed to accept solid or stranded copper conductors only. Lugs shall be suitable for 90° C rated wire, sized according to the 75° C temperature rating per NEC Table 310-16. Branch circuit breakers rated 30 amperes and below shall be UL Listed to accept 60° C rated wire.
   g. Breakers shall be UL Listed for use with the following factory installed accessories: Shunt Trip, Auxiliary Switch, and Alarm Switch.

4. Enclosures

   a. Type 1 Boxes

      1) Boxes shall be hot zinc dipped galvanized steel constructed in accordance with UL 50 requirements. Unpainted galvannealed steel is not acceptable.
      2) Boxes shall have removable end walls with knockouts located on one end. Boxes shall have welded interior mounting studs. Interior mounting brackets are not required.
      3) Box width shall be 20” wide maximum.

   b. Type 1 Fronts

      1) Front shall meet strength and rigidity requirements per UL 50 standards. Front shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
      2) Fronts shall be hinged 1-piece with door. Mounting shall be flush/surface as indicated on associated schedules and drawings.
      3) Panelboards shall have MONO-FLAT fronts with concealed door hinges and mounted with trim screws. Front shall not be removable with the door locked. Doors on front shall have rounded corners and edges shall be free of burrs.
      4) Front shall have cylindrical tumbler type lock with catch and spring-loaded stainless-steel door pull. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock. A clear plastic directory cardholder shall be mounted on the inside of door.

   c. **Type 3R**

      1) Enclosures shall be constructed in accordance with UL 50 requirements. Enclosures shall be painted with ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
      2) All doors shall be gasketed and equipped with a tumbler type vault lock and two (2) additional quarter turn fasteners on enclosures 59 inches or more in height. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock. A clear plastic directory cardholder shall be mounted on the inside of door.
      3) Maximum enclosure dimensions shall not exceed 21” wide and 6.5” deep.

2.04 IDENTIFICATION

A. Panel board Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panel board door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panel board door, mounted in metal frame with transparent protective cover.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1.

B. Install panel boards and accessories according to NECA 407/NEMA PB 1.1.

C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

D. Mount top of trim 90 inches above finished floor unless otherwise indicated.

E. Mount panel board cabinet plumb and rigid without distortion of box.

F. Mount recessed panel boards with fronts uniformly flush with wall finish and mating with back box.

G. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

H. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

I. Install filler plates in unused spaces.

J. Stub four 1-inch empty conduits from panel board into accessible ceiling space or space designated to be ceiling space in the future. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

K. Wiring shall be done in an orderly fashion with crisp lines and good connections, torqued to the manufacturer’s required ratings.

3.02 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements per standard codes.

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panel board door.

C. Panel board Nameplates: Label each panel board with a nameplate complying with requirements for identification.

D. Device Nameplates: Label each branch circuit device in power panel boards with a nameplate complying with requirements for identification.

E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.03 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panel board bus, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panel boards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panel boards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.04 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain and to use

END OF SECTION

SECTION 262726

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard-grade receptacles, 120 V, 20 A.
2. GFCI receptacles, 120 V, 20 A.
3. Toggle switches, 120/277 V,20 A.
4. Occupancy sensors.
5. Wall-box dimmers.
6. Wall plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates with labels as specified in Section26 05 53 .

C. Samples: One for each type of device and wall plate specified, in each color specified.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 Manufacturers: Subject to compliance with requirements, provide products by the following:

A. Receptacles, spec grade, Decora Style, 20A rated:
1. Leviton
2. Pass & Seymour
3. Hubbell

B. Switches, Decora style 20A rated, spec grade (District Standard):
1. Leviton
2. Pass & Seymour
3. Hubbell

C. Occupancy Sensors:
1. nLight Devices

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. RoHS compliant.

D. Comply with NEMA WD 1.

E. Device Color:

1. Wiring Devices Connected to Normal Power System: **White** or **as selected by Architect** unless otherwise indicated or required by NFPA 70 or device listing.

F. Wall Plate: All cover plates for receptacles and switches shall be 302 Stainless steel.

2.3 STANDARD-GRADE RECEPTACLES, 120 V, 20 A (All devices shall be Decora Style with matching stainless-steel covers).

A. Duplex Receptacles, 120 V, 20 A:
1. Description: Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498 and FS W-C-596.

B. Tamper-Resistant Duplex Receptacles, 120 V, 20 A:
1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498 and FS W-C-596.
4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

C. Weather-Resistant Duplex Receptacle, 120 V, 20 A:
1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.
4. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

D. Tamper- and Weather-Resistant Duplex Receptacles, 120 V, 20 A:
1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.
4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.4 GFCI RECEPTACLES, 120 V, 20 A (All devices shall be Decora Style with matching stainless-steel covers).

A. Duplex GFCI Receptacles, 120 V, 20 A:
1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: **Feed** through.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

2.5 Tamper-Resistant Duplex GFCI Receptacles, 120 V, 20 A: (All devices shall be Decora Style with matching stainless-steel covers).

1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: **Feed** through.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

2.6 Tamper- and Weather-Resistant, GFCI Duplex Receptacles, 120 V, 20 A: (All devices shall be Decora Style with matching stainless-steel covers).
1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-15R.
3. Type: **feed** through.
4. Standards: Comply with UL 498 and UL 943 Class A.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.7 DECORA STYLE SWITCHES, 120/277 V, 20 A

A. Single-Pole Switches, 120/277 V, 20 A:
1. Standards: Comply with UL 20 and FS W-S-896.

B. Two-Pole Switches, 120/277 V, 20 A:
1. Comply with UL 20 and FS W-S-896.

C. Three-Way Switches, 120/277 V, 20 A:
1. Comply with UL 20 and FS W-S-896.

D. Lighted Single-Pole Switches, 120/277 V, 20 A:
1. Description: Handle illuminated when switch is [**on**] [**off**].
2. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

2.8 DECORATOR-STYLE DEVICES, 20 A

A. Decorator Duplex Receptacles, 120 V, 20 A:

1. Description: Two pole, three wire, and self-grounding. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.

B. Decorator Tamper-Resistant Duplex Receptacles, 120 V, 20 A :

1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.
4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

C. Decorator, Tamper- and Weather-Resistant, Duplex Receptacles, 120 V, 20 A :

1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.
4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

D. Decorator Single-Pole Switches, 120/277 V, 20 A :

1. Comply with UL 20.

E. Decorator Single-Pole Lighted Switches,120/277 V, 20 A :

1. Description: Square face illuminated when circuit is switched off.
2. Standards: Comply with UL 20.

2.9 OCCUPANCY SENSORS (Refer to Section 26 09 43)

A. Wall Switch Sensor Light Switch, Dual Technology.

1. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual (ultrasonic and passive infrared) technology.
2. Standards: Comply with UL 20.
3. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
4. Adjustable time delay of **5 to 30** minutes.
5. Able to be locked to **Automatic** and **Manual**-On mode.
6. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc

2.10 Wall Sensor Light Switch, Passive Infrared: (Refer to Section 26 09 43)

1. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using passive infrared technology.
2. Standards: Comply with UL 20.
3. Connections: Provisions for connection to BAS.
4. Connections: Hard wired.
5. Connections: Wireless.
6. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
7. Integral relay for connection to BAS.
8. Adjustable time delay of 5 to 15 minutes.
9. Able to be locked to **Automatic** and **Manual**-On mode.
10. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.

2.11 TIMER LIGHT SWITCH (Refer to Section 26 09 43)

A. Digital Timer Light Switch:

1. Description: Switchbox-mounted, combination digital timer and conventional switch lighting-control unit, with backlit digital display, with selectable time interval in **10** to **20** minutes increments.
2. Standards: Comply with UL 20.
3. Rated 10 A at 120 V ac or 10 A at 277 V ac for LED lighting, and 1/4 hp at 120 V ac.

2.12 WALL PLATES

A. Single Source: Obtain wall plates from same manufacturer of wiring devices.

B. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: 0.035-inch- thick, satin-finished, Type 302 stainless steel.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover and listed and labeled for use in wet and damp locations.

C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

2. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
3. Install wiring devices after all wall preparation, including painting, is complete.

C. Device Installation:

1. Connect devices to branch circuits using pigtails that are not less than 12 inches in length.
2. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

D. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles **down**, and on horizontally mounted receptacles to the **right**.

E. Device Plates:
1. Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
2. Each device and switch plate shall have a printed labeled with the panel name and circuit number, see section the Electrical Identification specification for additional information.

F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi gang wall plates.

G. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 FIELD QUALITY CONTROL

A. Tests for Receptacles:

1. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
2. Using the test plug, verify that the device and its outlet box are securely mounted.

B. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION

SECTION 26 33 53
EMERGENCY LIGHTING POWER SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General and Supplementary Conditions and District Division 01 apply to this section.

B. Furnishing, installing, connecting & commissioning emergency system to lighting fixtures, signal systems, and electrical loads as indicated on Drawings.

C. This specification defines the electrical and mechanical characteristics and requirements for a line interactive, single-phase, solid-state uninterruptible power supply, hereafter referred to as the UPS system. The UPS shall provide high quality, computer grade AC power for today's electronic lighting loads (power factor corrected and self-ballast fluorescent, incandescent, quartz re-strike or halogen or LED and HID) during emergency backup.

D. The UPS shall incorporate a high frequency pulse width modulated (PWM) inverter utilizing IGBT technology, a microprocessor-controlled inverter and a temperature compensating battery charger, communication port, and a user-friendly control panel with audible and visual alarms.

E. Related Sections:

1. Division 26

1.02 DESIGN REQUIREMENTS

A. Emergency systems shall be supplied from storage batteries with charging unit with a minimum of 90 minutes back-up capacity for lighting systems by the furnishing of an IPS, Systems shall be installed in accordance with requirements of all codes and regulations.

1.03 STANDARDS

A. The UPS shall be designed in accordance with the applicable sections of the current revision of the following documents. Where a conflict arises between these documents and statements made herein, the statements in this specification shall supersede.

1. UL 924 Standard Emergency Lighting and Power Equipment

2. UL 924A Auxiliary Lighting

3. ANSI C62.41 (IEEE 587)

4. ANSI C62.42.45 (Cat. A & B)

5. National Electrical Code

6. NFPA- 101 (Life Safety Code)

7. OSHA

8. California Seismic Zone 4 complaint.

1.04 SUBMITTALS

A. Proposal Submittals. Submittals with the proposal shall include the following:

1. System configuration with single-line diagrams

2. Functional relationship of equipment including weights dimensions and heat Dissipation.

3. Descriptions of equipment to be furnished, including deviations from these specifications.

4. Size and weight of units to be handled by installing contractor.

B. UPS Delivery Submittals. Submittals upon UPS delivery shall include:

1. Complete set of submittal drawings.

2. One set of instruction manuals. Manuals shall include a functional description of the equipment, installation, safety precautions, instructions, step-by-step operating procedures, and routine maintenance guidelines, including illustrations.

3. Submit a materials list for this system with catalog cuts, technical data and manufacturer's specifications of all system components including batteries. The submittal, include evidence that the batteries supplied have a true 20-year VRLA type life by furnishing a copy of a test performed by a recognized test laboratory per Bell core TR-766.

1.05 QUALITY ASSURANCE

A. Provide a 2 -year start up, same day training and full run test, factory startup.

B. The manufacturer shall have been producing inverter system equipment for at least 10 consecutive years.

C. Systems shall undergo full load burn in testing at the factory.

D. Systems shall be UL listed.

E. A manufacturer’s technical representative shall be available for system start-up, warranty work, and service calls.

F. Before shipment, the manufacturer shall fully and completely test the system to assure compliance with the specification.

PART 2 - PRODUCT

2.01 APPROVED MANUFACTURERS AND PRODUCT DESCRIPTION

A. Approved Manufacturer: The Emergency Lighting Inverter System shall be a Myers Emergency Power Systems Supernova Series Model # 1 - I - 10 - S - B -A- 20 -24 - C-C F - M - Z - BIP - 2YWT.

and shall be manufactured by:

Myers Emergency Power Systems, LLC
44 South Commerce Way
Bethlehem, PA 18017
Tel: 610-868-3500; Fax: 610-868-8686
Toll Free: 1-800-526-5088

2.02 Physical Specifications

KW/kva	Input/output Voltages	MODEL NUMBER	DC Volts	BTU/ Hr	**Cabinet Size UPS (Battery) (W x H x D)	**Weigh(lbs.)	
						UPS	Batt.
10	277/277	1 - I - 10 - S - B -A- 20 -24 - C-C F - M - Z - BIP - 2YWT	144	680	42"X78.3" X 25"	1166	1288

2.03 FABRICATION

A. All materials of the UPS shall be new, of current manufacture, high grade, free from all defects and shall not have been in prior service except as required during factory testing.

B. The CIS module and batteries shall be housed in a single freestanding NEMA type 1 enclosure. Front access only shall be required for installation, adjustments and expedient servicing (MTTR: < 15 minutes). All components shall have a modular design and quick disconnect means to facilitate field service.

C. The UPS shall be powder painted with the manufacturer's standard color. The UPS shall be constructed of replaceable subassemblies. Like assemblies and like components shall be interchangeable.

D. Cooling of the UPS shall be forced air in emergency mode with internally mounted fans to minimize audible noise. Fans shall not operate in standby mode. Fan power shall be provided by the UPS. No air filters shall be required.

2.04 COMPONENTS

The UPS shall be comprised of the following components:

A. CIS Module

The CIS module shall contain an inverter, an AC distribution module with an input circuit breaker, back-feed relay, a boost tap transformer, control, and monitoring subsystems.

B. Battery Module

The battery module shall contain the battery plant required to produce the reserve energy to supply the inverter during abnormal AC mains conditions. The 90 - minute battery module shall be contained in the same cabinet as electronics regardless of the system VA.

C. Battery Charger

1. General

In normal operating mode, the AC input voltage is rectified and boosted to the proper DC level by controlling the power bridge with a microcontroller to recharge the batteries. The battery charger circuit supplies first a constant current during bulk charge and a constant voltage during float charge to the batteries. Once the batteries have received a full recharge, a constant trickle charge maintains batteries at maximum level. Recharge time is 24 hours maximum at nominal AC input voltage. The AC ripple current of the DC output meets the battery manufacturer specification, thus ensuring the maximum battery lifetime.

2. AC Input Current

The charger unit is provided with an ac input current limiting circuit whereby the maximum input current shall not exceed 150% of the output full current rating.

3. Automatic Restart

Upon restoration of utility AC power, after a utility AC power outage and after a full CIS automatic end-of-discharge shutdown, the CIS will automatically restart, performing the normal CIS start up.

4. DC Filter

The charger shall have an output filter to minimize AC ripple voltage into the battery. Under no conditions shall ripple voltage into the battery exceed 2% RMS.

5. Battery Recharge

The charger can produce battery-charging current sufficient to recharge the fully discharged battery bank within a 24-hour period. After the battery is recharged, the charger shall maintain full battery charge until the next emergency operation.

6. Over-voltage Protection

The charger is equipped with a DC over-voltage protection circuit so that if the DC voltage rises above the pre-set limit, the charger shuts down automatically and initiates an alarm condition.

D. Inverter

1. General

The inverter converts DC voltage supplied by the battery to AC voltage of a precisely stabilized amplitude and frequency that is suitable for powering most sophisticated electrical equipment.

The inverter output voltage is generated by sinusoidal pulse width modulation (PWM). The use of a high carrier frequency for PWM and a dedicated ac filter circuit consisting of a transformer and capacitors, ensure a very low distortion of the output voltage (THD<3% on linear loads).

2. Overload Capability

The inverter during emergency modes shall be capable of supplying current and voltage for overloads exceeding 100% and up to 150% of full load current for 16 line cycles, 115% for 10 minutes.

3. Output Power Transformer

A dry type of power transformer provides the inverter AC output. The transformer is built with copper wiring exclusively. The hottest winding temperature of the transformer shall not exceed the temperature limit of the transformer insulation class of material at ambient temperature.

E. Display and Controls

1. Monitoring and Control

The CIS system provides operation monitoring and control, audible alarms, and diagnostics. The front-mounted control panel includes a 4-line by 20-character vacuum fluorescent display and a keypad for user interface. The display will be menu driven. The system will have a continuous scrolling display of the following: Date & time, System Status (AC Status, Battery Status, Charger Status) and any system faults: This allows the operator to easily “watch” system functions as they occur and check on virtually any aspect of the system’s operation. Monitoring and control are microprocessor-based for accuracy and reliability. To ensure only authorized personnel can operate the unit, the system is multi-level password protected for all control functions and parameter changes.

2. Metering

Scrolling through the meter functions can monitor the following measurements:

a. Utility input voltage
b. System output voltage
c. Battery voltage
d. Battery current
e. System output current
f. System output VA
g. Inverter wattage
h. System temperature
i. Date & time
j. System Days

F. Audible Alarm

1. Audible alarm will activate with any of the following conditions and automatically store the 75 most recent events.

    a. High battery charger voltage
    b. Charger Fault
    c. High AC input voltage
    d. Low AC input voltage
    e. Near low battery voltage
    f. Low battery voltage
    g. Load reduction fault
    h. High Ambient temperature
    i. Inverter fault
    j. Output fault
    k. Output overload
    l. Output overload shutdown
    m. System Test Failure

G. Communication Interfaces

1. BACnet MS/TP Interface

    The system shall be equipped with an RS-485 serial port for remote communications to a Building Management System (BMS) via BACnet MS/TP protocol. The BACnet interface shall support standard baud rates (9600, 19200, 38400, 57600, 115200) and MAC addressing (0-127), and have a programmable systemwide Device Instance number. The BACnet interface shall support standard BACnet discovery. The BACnet interface shall provide read-only access to the following inverter telemetry:

    a. Input Voltage(s)
    b. Output Voltage(s)
    c. Output Current(s)
    d. Total Output Power
    e. Ambient Temperature
    f. Battery Voltage
    g. Battery Current
    h. Total Time On Battery
    i. Days of Operation
    j. The results of the inverter's last auto-run monthly self-test
    k. The results of the inverter's last auto-run yearly self-test
    l. Alarm states (no utility, on battery, battery low, input voltage high or low, inverter failure detected, inverter overloaded and overload shutdown, 'load reduction' activated, ambient temperature high, and battery charger fault).
    m. Event logs, Alarm logs and Test logs, as text files downloadable via BACnet file transfer

H. Manual and Programmable Testing

The system shall incorporate a manual test function and two automatic test modes. The system will perform a programmable, self-diagnostic monthly test for 5 minutes, which is preset, for the 15th of every month and the user can program the event day and time. The yearly self-diagnostic test is for 90 minutes, and the user can program the day and time the event is to take place. The microprocessor automatically records the last 75 test events in its own

separate test result log.

I. Battery Assembly

The batteries are a front access sealed; lead-acid valve regulated battery cells with a one year full, nine-year prorated warranty. Batteries shall be interconnected via buss bars and cables will be provided for shelf interconnects where required. A disconnect means shall be included for isolation of battery assembly from the UPS module.

J. System Options

The central inverter system shall include the following options:

1. Battery Cabinet Fan

2. Output Circuit Breakers:

   a. Distribution circuit breakers are for output load protection - Protection for the normally on loads.

3. Output Circuit Breaker Trip Alarm:

   An audible and visual alarm activates when an output distribution circuit breaker is open or has tripped.

4. Summary Form “C” Contacts:

   Form “C” contacts rated at 5 amps maximum at 250VAC/30VDC. Dry contacts will change state when any system alarm activates. Contacts change states with the following alarms: High battery charger fault, near low battery, low battery, load reduction fault, output overload, high/low AC input volts, high ambient temperature, inverter fault, and with optional circuit breaker trip alarm.

5. Summary Form “C” Contacts:

   Form “C” contacts rated at 5 amps maximum at 250VAC/30VDC. Dry contacts will change state when any system alarm activates. Contacts change states with the following alarms: High battery charger fault, near low battery, low battery, load reduction fault, output overload, high/low AC input volts, high ambient temperature, inverter fault, system test fault, and with optional circuit breaker trip alarm.

6. Fast Charge:

   This is a battery charger upgrade, which decreases the time to recharge a fully discharged battery bank to a full charge. The recharge time is decreased from the standard 24-hour period to a 12-hour period.

7. BACnet MS/TP:

   Allows for communication of data from the inverter over RS-485 using BACnet MS/TP protocol. See Communication Interfaces specification.

8. Battery Temperature Monitor

9. Status Monitoring Contacts

10. Drip Top

11. Inverter On Dry Contact

12. Load Control Relay

13. Summary Fault Contact

14. Output Trip Alarm (Supervised Contact)

15. Seismic Mounting

PART 3 - EXECUTION

3.01 WIRING

A. All wiring shall be installed in conduit. Input and output wiring shall enter the cabinet in separate conduits. Wiring Installation: The Inverter cabinet conduit entry arrangement shall allow for flexibility of user wiring installation. The wiring shall be routed thru the top or either side of the cabinet.

B. Wiring Installation: Inverter cabinet conduit entry arrangement shall allow for flexibility of user wiring installation. The wiring shall be routed thru the top or either side of the cabinet. All wiring shall be installed in conduit. Input and output wiring shall enter the cabinet in separate conduits.

3.02 Wiring Termination: The inverter input and output power connections shall be hard wired within the cabinet. Input and output terminal blocks shall be provided for easy field wiring of the Inverter and battery cabinets. System Operation: The system shall allow connection of “normally on” loads. Connected loads shall be carried via the transfer circuit by the utility during normal operation or by the system inverter during utility failures without interruption. Connected Loads: The Perfect Central Lighting Inverter system shall be designed to maintain the normal operation and performance integrity of all connected loads including voltage and frequency sensitive equipment by providing true "no break", continually conditioned sinusoidal output. Refer to plans for type and location of loads served by the system.

3.03 Factory Startup: Provides a factory service representative to perform the initial startup of the Central Lighting Inverter System.

Site start-up and testing shall be provided by the manufacturer's field service representative during normal working hours (Mon. - Fri. 8 a.m. - 5 p.m.). Individual scheduling requirements can usually be met with 7 working days advance notice. Site testing shall consist of a complete test of the UPS and accessories by the UPS manufacturer in accordance with manufacturer's standards. Manufacturer's approved service representative must perform commissioning for two-year warranty to apply.

3.04 Drawings and manuals: Drawings and manuals supplied with each unit shall include:

A. Complete set(s) of shop drawings showing physical dimensions, mounting information, and wiring diagrams.
B. Installation Manual(s) with complete instructions for locating, mounting, interconnecting, and wiring of the system.
C. User Manual(s) outlining complete operating and preventive maintenance procedures.

3.05 Installation: The Central Lighting Inverter shall be installed in accordance with all the appropriate manufacturer's installation instructions and in compliance with all appropriate codes.

3.06 ENVIRONMENTAL REQUIREMENTS

A. Operating Temperature: 0°C to 40°C (32°F to 104°F)

B. Storage Temperature: - 20°C to +45°C (- 4°F to 113°F)

C. Maximum Recommended Storage Temperature for Batteries: 25°C (77°F) for up to six months. Storage at up to 40°C (104°F) is acceptable for a maximum of three months.

D. Humidity (operating and storage): 0 to 95% RH, non-condensing.

E. Altitude: Up to 6000 ft (1,829 meters)

Audible Noise: -57 dB typical on "response curve A".

3.07 UNIT START-UP and SITE TESTING

Site start-up and testing shall be provided by the manufacturer's field service representative during normal working hours (Mon. - Fri. 8 a.m. - 5 p.m.). Individual scheduling requirements can usually be met with 7 working days advance notice. Site testing shall consist of a complete test of the CIS and accessories by the UPS manufacturer in accordance with manufacturer's standards. Manufacturer's approved service representative must perform commissioning for two-year warranty to apply.

3.08 REPLACEMENT PARTS

Parts shall be available through Field Service Centers throughout the country. Recommended spare parts shall be fully stocked by local field service personnel with back-up available from manufacturing location.

3.09 MAINTENANCE CONTRACTS

A complete offering of preventive and full-service maintenance contracts for both the UPS system and batteries shall be available. An extended warranty and preventive maintenance packages if requested by the Campus shall be available. Factory-trained service personnel shall perform warranty and preventive maintenance service.

END OF SECTION

SECTION 26 43 13
SURGE PROTECTION FOR LOW VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 GENERAL

1.1 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for surge protection for low voltage electrical power circuits as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:

1. Requirements for integrated SPDs (installed from the factory) for low voltage power distribution and control equipment.

1.2 REFERENCES

A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. ANSI/IEEE C62.41.1, “Guide on the Surges Environment in Low Voltage (1000 V and Less) AC Power Circuits.”

2. ANSI/IEEE C62.41.2, “Recommended Practice on Characterization of Surges in Low Voltage (1000 V and Less) AC Power Circuits.”

3. ANSI/IEEE C62.45, “Guide on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits.”

C. International Organization for Standardization (ISO):

1. ISO 9001, "Quality Management Systems - Requirements."

D. National Fire Protection Association (NFPA):

1. NFPA 70, "National Electrical Code," hereinafter referred to as NEC.

E. Underwriters Laboratories, Inc. (UL):

1. UL 67, "Standard for Panelboards."

2. UL 96A, "Standard for Installation Requirements for Lightning Protection Systems."

3. UL 845, "Motor Control Centers."

4. UL 857, "Busways."

5. UL 891, "Switchboards."

6. UL 1283, “Standard for Safety for Electromagnetic Interference Filters."

7. UL 1449, "Standard for Surge Protective Devices."

8. UL 1558, "Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear."

1.3 DEFINITIONS

A. $I_{(n)}$: Nominal discharge current rating.

B. MCOV: Maximum continuous operating voltage.

C. Protection Modes: The pair of electrical connections where the VPR applies.

D. MOV: Metal oxide varistor; an electronic component with a significant non-ohmic current voltage characteristic.

E. OCPD: Overcurrent protective device.

F. SCCR: Short circuit current rating.

G. SPD: Surge protective device.

H. VPR: Voltage protection rating.

1.4 SYSTEM DESCRIPTION

A. General SPD Requirements:

1. SPD with accessories shall be listed and labeled as defined in NEC, by UL, and marked for intended location and application.

2. Comply with UL 1449.

3. Comply with UL 1283 (applies to Type 2 SPDs).

4. Design in accordance with ANSI/IEEE C62.41.1, ANSI/IEEE C62.41.2, and ANSI/IEEE C62.45.

5. SPDs manufacturer shall be ISO 9001 certified.

6. MCOV of the SPD shall not be less than 125 percent for 208Y/120V nominal RMS system voltages.

7. SPDs installed internal to the distribution equipment shall be of the same manufacturer as the equipment. The equipment shall be fully tested and certified to the following UL standards:

a. Panelboards: UL 67.

1.5 SUBMITTALS

A. General: See Section 01 33 00 - Submittal Procedures - Submittals.

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications.

1. For each type of product indicated include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

2. Provide verification the SPD is listed or recognized through UL to the latest safety standard, UL 1449.

C. Shop Drawings: Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer's standard product data.

D. Operation and Maintenance Data: Submit operation and maintenance data for surge protection for low voltage electrical power circuits to include in operation and maintenance manuals.

E. Warranty Data: Submit sample of special warranties.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of surge protection for low voltage electrical power circuits of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of five years.

2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing surge protection for low voltage electrical power circuits similar in type and scope to that required for this Project and shall be approved by the manufacturer.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

C. Single Source Responsibility: Obtain surge protection for low voltage electrical power circuits and required accessories from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work. Any materials which are not produced by the manufacturer shall be acceptable to and approved by the manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.

B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.8 WARRANTY

A. General: See Section 01 77 00 - Closeout Procedures.

B. Special Warranty: Submit a written warranty executed by the manufacturer, the Installer, and the Contractor, agreeing to repair or replace surge protection for low voltage electrical power circuits that fail in materials or workmanship within the specified warranty period.

1. Warranty Period: Warranty period shall be 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Product specified is “Surgelogic Surge Protection” as manufactured by Square D by Schneider Electric. Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Architect/Engineer will be the sole judge of the basis of what is equivalent.

2.2 SERVICE ENTRANCE SUPPRESSORS

A. SPDs: Comply with UL 1449.

1. SPDs installed on the line side of the service entrance OCPD shall be Type 1 SPDs. SPDs installed on the load side of the service entrance OCPD shall be either Type 1 or Type 2 SPDs.

2. Type 2 SPDs shall also comply with UL 1283.

B. Features and Accessories: SPDs shall provide the following features and accessories:

1. Internal fusing design capable of disconnecting the SPD before any damaging external effects to the suppressor or surroundings occur.

2. Indicator light(s) display for power and protection status with push-to-test capabilities.

3. Audible alarm with silencing switch.

4. Form C contacts; one normally open and one normally closed for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.

5. Surge counter with reset switch.

6. Optional integrals disconnect switch for externally mounted SPDs. SPDs integrated into factory supplied equipment shall have an input disconnect switch or circuit breaker unless indicated on the equipment drawings/data sheets.

C. Surge Current Rating: The surge current rating of the SPD shall be dependent of its category/location, as follows:

Category/Location	Application	Per Phase	Per Mode
C	Service Entrance	240 kA	120 kA
B	Distribution	160 kA	80 kA

D. Protection Modes:

1. UL 1449 VPR for grounded WYE configured circuits shall not exceed the following:

Modes	208Y/120
L-N; L-G; N-G	800 volts
L-L	1200 volts

E. SCCR: Per NEC 285.6, the short circuit current rating of the SPD shall be equal to or greater than the available short circuit current at the point on the system where installed.

F. Nominal Discharge Current Rating: 20 kA $I_{(n)}$.

1. Surge protective devices located at service entrance locations shall carry a minimum nominal discharge current rating of 20 kA to meet the requirements of UL 96A.

2.3 DISTRIBUTION/ BRANCH PANEL SUPPRESSORS

A. SPDs: Comply with UL 1449.

1. Type 1 or Type 2 SPDs.

2. Type 2 SPDs shall also comply with UL 1283.

B. Features and Accessories: SPDs shall provide the following features and accessories:

1. Internal fusing design capable of disconnecting the SPD before any damaging external effects to the suppressor or surroundings occur.

2. Indicator light(s) display for power and protection status.

3. Audible alarm with silencing switch.

4. Form C contacts; one normally open and one normally closed for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.

5. Surge counter with reset switch.

6. SPDs integrated into factory supplied equipment shall have an input disconnect switch or circuit breaker unless indicated on the equipment drawings/data sheets.

C. Surge Current Rating: The surge current rating of the SPD shall be dependent of its category/location, as follows:

Category/Location	Application	Per Phase	Per Mode
B	Distribution	160 kA	80 kA
B	Branch	120 kA	60 kA

D. Protection Modes:

1. UL 1449 VPR for grounded WYE configured circuits shall not exceed the following:

Modes	208Y/120
L-N; L-G; N-G	800 volts
L-L	1200 volts

E. SCCR: Per NEC 285.6, the short circuit current rating of the SPD shall be equal to or greater than the available short circuit current at the point on the system where installed.

F. Nominal Discharge Current Rating: 10 kA $I_{(n)}$.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the District and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 INSTALLATION

A. Install surge protection for low voltage electrical power circuits in accordance with reviewed product data, final shop drawings, manufacturer's written instructions and recommendations, and as indicated on the Drawings.

B. Install SPD devices at the service entrance in accordance with NEC. SPDs installed on the line side of the service entrance OCPD shall be Type 1 SPDs. SPDs installed on the load side of the OCPD shall be either Type 1 or Type 2 SPDs.

C. Follow manufacturer's recommended installation practices.

1. Provide a minimum 30 ampere circuit breaker as a dedicated disconnecting means for the SPD unless otherwise indicated.

2. Install SPDs with properly rated conductors between suppressor and points of attachment as short and straight as possible; adjust circuit breaker positions to achieve shortest and straightest leads.

3. Do not splice and extend SPD leads unless specifically permitted by manufacturer.

4. Twist input conductors together to reduce the input inductance.

3.3 FIED QUALITY CONTROL

A. See Section 26 96 00.D Testing Requirements

B. Perform the following tests and inspections.

1. Compare equipment nameplate data for compliance with the Drawings and the Specifications.

2. Inspect anchorage, alignment, grounding, and clearances.

3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

C. A SPD will be considered defective if it does not pass inspections.

D. Prepare inspection reports.

3.4 DEMONSTRATION

A. Start-Up Service:

1. Complete start-up checks according to manufacturer's written instructions.

2. Do not perform insulation resistance tests of the distribution wiring equipment with SPDs installed. Disconnect all wires, including, but not limited to, neutral of the SPD before conducting insulation resistance tests, and reconnect them immediately after the testing is over.

3. Energize SPDs after power system has been energized, stabilized, and tested.

3.5 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the surge protection for low voltage electrical power circuits shall be without damage at time of Substantial Completion.

END OF SECTION

SECTION 265119

INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following types of LED luminaires:

1. Cylinder.
2. Downlight.
3. Highbay, linear.
4. Highbay, nonlinear.
5. Linear industrial.
6. Recessed, linear.
7. Strip light.
8. Surface mount, linear.
9. Surface mount, nonlinear.
10. Suspended, linear.
11. Suspended, nonlinear.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
2. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.

B. Product Certificates: For each type of luminaire.

C. warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.

C. Provide luminaires from a single manufacturer for each luminaire type.

D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.6 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: **Five** year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**.

B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.

1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified **and the luminaire will be fully operational during and after the seismic event**."

C. Ambient Temperature: **41 to 104 deg F**.

1. Relative Humidity: Zero to 95 percent.

D. Altitude: Sea level to **1000 feet.**

2.2 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specified LED lamp type.
b. CCT and CRI.

C. Recessed luminaires shall comply with NEMA LE 4.

D. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

F. California Title 24 compliant.

G. Fixtures must have integral ballasts/drivers (no remote ballasts/drivers).

2.3 REFER TO LIGHTING FIXTURE SCHEDULE FOR EACH TYPE OF LIGHT FIXTURE AND REQUIREMENTS.

A. With integral LED Driver mounting provisions.

B. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. Recessed luminaires shall comply with NEMA LE 4.

2.4 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Steel:

1. ASTM A 36/A 36M for carbon structural steel.
2. ASTM A 568/A 568M for sheet steel.

C. Stainless Steel:

1. 1. Manufacturer's standard grade.
2. 2. Manufacturer's standard type, ASTM A 240/240 M.

D. Galvanized Steel: ASTM A 653/A 653M.

E. Aluminum: ASTM B 209.

2.5 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.6 LUMINAIRE SUPPORT

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 3/4-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, **12 gage.**

D. Rod Hangers: 3/8 -inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.2 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION

SECTION 26 5561

THEATRICAL LIGHTING

3

PART 1 - GENERAL

1.01 SUMMARY

A. This specification section includes the engineering, fabrication, furnishing, delivery, and installation of new theatrical stage lighting equipment as specified in the 'Products' specifications and as indicated on the related stage lighting drawing documents for the auditorium stage.

B. Contract Documents and General Requirements apply to the work of this Section.

C. All bidders shall fully inform themselves of the conditions under which the work is to be performed. No additional compensation shall be allowed for any labor or item the bidder could have been fully informed of prior to the bid date.

D. While the components, quantities, and arrangements described herein and shown on the drawings indicate specific details for the realization of the stage systems, bidders may propose alternate details and components that will fulfill the functional parameters of the envisioned system. In such event, bidders shall submit a complete set of specifications and drawings, not less detailed than these and following the same general outline, together with a detailed statement indicating paragraph by paragraph wherein the equipment to be offered deviates from specifications included in this bid request. Where alternate proposals are offered they shall be submitted with the amount to be added or deducted from the base bid which is required from all bidders.

1.02 SCOPE OF WORK

A. Work under this section consists of the installation of all materials and equipment necessary for the proper operation of all stage lighting equipment. Installation contractor shall furnish qualified personnel to test and adjust the equipment after installation until specified performance is attained.

B. Preparation and submission of complete engineered shop drawings for approval by the Architect and Theatre Systems Consultant.

C. Verification of conditions and dimensions at the job site.

D. The adjustment and testing of the completed installation by the Contractor's personnel, subject to Architect and Theatre Systems Consultant's approval.

E. Submission of required record documents.

F. Coordination with other affected work, trades, and inspections.

G. Installation work includes, but is not limited to the following:

1. New stage lighting relay and dimmer racks.
2. New stage lighting data distribution and lighting control processor racks.
3. New lighting control receptacle stations and low voltage control wiring.
4. New house lighting control stations and low voltage control wiring.
5. New stage manager's control panel and low voltage control wiring.

6. New worklight control stations and low voltage control wiring.

7. New lighting control DMX512 protocol wiring, low voltage house light, worklight, and rehearsal light wiring, Ethernet data wiring, and any additional new control wiring per the systems manufacturer's final shop drawings.

8. New circuitry distribution connector strips, plug boxes and wall boxes.

9. New stage lighting spotlight fixtures and followspots.

10. New stage lighting control console, remote focus unit, video monitors, and Ethernet nodes.

11. New power service, circuit protection, system conduit, raceways, junction boxes, pull boxes and related wiring as specified on the electrical drawings.

12. Installation and connection of system line voltage equipment and components.

13. The contractor shall furnish and install all low voltage stage lighting control wiring. The contractor shall coordinate with the stage lighting equipment manufacturer regarding the responsibility for termination of stage lighting control low voltage wiring.

14. Initial hanging and plugging of new portable stage lighting fixtures per the Theatre Systems Consultant's directive.

15. All scaffolding, hoisting equipment, ladders, man-lift devices, tools, etcetera necessary to perform the work.

H. The above scope of work is intended as a reference guide only and is not intended to define the limits of the work necessary for a complete installation. All labor, materials, and equipment necessary for the proper operation of all systems must be provided.

1.03 SYSTEMS INTEGRATOR

A. The Contractor shall utilize a System Integrator to coordinate and assist in the installation of all aspects of the theatrical lighting system as specified in this section. This shall include but not be limited to all dimming and control equipment as well as integration with the architectural lighting fixtures connected to the dimming and control system. The following companies have prior approval as System Integrator:

1. Polaris Lighting
   624 Irving Ave.
   Glendale, CA. 91201
   (818) 265-0330

2. BCT Entertainment
   2780 East Regal Park Dr.
   Anaheim, CA. 92806
   (714) 237-9270

3. Kinetic Lighting
   722 Thompson Ave.
   Glendale, CA. 91201
   (310) 837-3204

4. LVH Entertainment
   3685 Medford St.
   Los Angeles, CA. 90063
   (805) 278-4584

5. Westview Productions
   5350 Vivian St. Suite A
   Arvada, CO 80002
   (844) 987-7378

B. In order to be considered as a System Integrator on this project, each Contractor requesting approval must submit to the Architect at least ten (10) days prior to the date of bid opening a letter expressing intent to be considered as an acceptable integrator. This letter shall include a list of at least five (5) projects of similar size and scope completed by this firm within the last five (5) years. Inspection of one completed installation may be requested by the Architect/Consultant's Representative prior to consideration of request to bid. The System Integrator shall have been in business under the same name for five (5) full years preceding the date of this bid doing work similar to the type specified. The decision of the Architect as to the capability of the Bidder to successfully complete and maintain the system based on this pre-qualification information shall be final.

C. Pre-Bid request letter shall include a statement that all major items of equipment shall be bid and supplied as specified, or shall contain details of all proposed substitute equipment for review by the Architect/Consultant's Representative. Substitute equipment items to include specifications, parts numbers, and details of interconnection to proposed system. The decision of the Architect as to the acceptability of substitute equipment shall be final.

1.04 RESPONSIBILITY

A. Organize and program the Work of the Section to harmonize with the work which will be performed by other contractors during the Project so that work will proceed as expeditiously as possible.

B. The engineering, fabrication, installation, and coordination of systems and associated components specified in this Section are the Contractor's responsibility.

C. Comply with all applicable code requirements and the requirements of federal, state, and local authorities having jurisdiction over the design, fabrication, installation, and operation of the systems and associated components specified in this section.

D. Take full responsibility for the proper placing and fitting of equipment and materials furnished under this Section into the structure.

E. Design components and install equipment to fit into the structure as built.

F. Specifications only establish criteria and do not attempt to dictate specific details and methods that may be necessary for proper installation; drawings related to the Work of this Section may therefore be diagrammatic.

G. Become familiar with the building construction and finishes, access and space available for equipment, and obvious interferences requiring special attention.

H. Check and verify pertinent dimensions, sizes, loads, and the appropriateness of structure supporting the proposed Work of this Section, both on the Drawings and in the field before proceeding with any work.

I. Provide additional structural and support members and guards as necessary for proper installation and operation of the Work of this Section.

J. All stage lighting equipment and hardware must be of new and recent manufacture.

K. All components utilized in the stage lighting equipment shall be specifically recommended by their manufacturer or trade organization for stage lighting applications. They shall be installed and used in accordance with the manufacturer's specification.

L. Provide equipment, devices, machinery, and systems based upon the following:

1. Safety to personnel during operation, use, and maintenance.

2. Adequate strength.

3. Reliability, with consideration for special or unusual requirements of the unit or installation.

4. Ease of maintenance.

5. Coordination with associated and adjacent systems provided under other Sections.

1.05 CODES, LABELS, AND STANDARDS

A. All stage lighting equipment and installation methods must conform to current State rules and all local codes and ordinances.

B. All components shall be listed by Underwriters Laboratories (UL).

C. A manufacturer's label shall be conspicuously and permanently attached to each piece of stage lighting equipment.

D. Those parts of the stage lighting equipment that require maintenance shall be safely and easily accessible and serviceable.

E. Conform to the applicable requirements of the current editions of the following reference codes or standards:

1. National Electrical Code.

2. United States Institute for Theatre Technology (USITT).

3. Entertainment Services & Technology Association (ESTA).

4. American National Standards Institute (ANSI).

F. Where in these Specifications one certain kind, type, or brand of manufacturer or material is named, it shall be regarded as the required minimum standard of quality. Substitutions lowering performance, quality, method of assembly or installation, or in general, not in keeping with Drawings and Specifications will not be permitted. Only written approval of the Architect and Theatre Systems Consultant will permit substitution for materials specified. Where both catalog number and description is indicated, requirements of description shall take precedence and prevail.

1.06 QUALIFICATIONS

A. Provide the Work of this Section under a single contractor with a contractor widely experienced in providing and installing theatrical stage lighting equipment and related electrical hardware of the quality and complexity specified in this Section.

B. Maintain a competent Supervisor, acceptable to the School and the Architect, during the entire installation. Change of Supervisor during the Project is not acceptable without prior written approval from the School and the Architect.

C. Employ only experienced electricians and stage lighting technicians on the Project.

D. Employ only certified welders, if welding is required.

1.07 PERMITS AND INSPECTIONS

A. Obtain and pay for required permits and inspections of Work of the Section.

B. Furnish material and Work under this Section that meets or exceeds applicable legal and code requirements.

C. Perform tests required by the Architect, School Representative, and authorities having jurisdiction.

1.08 SAFEGUARDS AND PROTECTION

A. Provide suitable barriers and warning signs associated with or adjacent to stage lighting installation wherever necessary for the protection or safety of workers on the Project, School's personnel, and others during construction. Maintain barriers and warning signs during installation of the Work of this Section.

B. Provide guards and guides at structural edges and corners and surrounding equipment as necessary to prevent fouling or tearing of adjacent theatrical equipment or contact with personnel.

C. Protect materials and equipment from dirt and damage. Cover materials until just before the completion of the Project to prevent the adhesion of foreign matter or unintended paint.

D. Replace damaged or defective work or material prior to final payment request.

E. Take full responsibility for loss or injury to persons or property resulting from neglect of the above precautions.

1.09 DELIVERY AND STORAGE OF MATERIALS

A. Contractor is responsible for the scheduling and timely delivery and placement of items furnished under this Section.

B. Clearly identify on each container the contents stored within.

1.10 SPARE PARTS

A. Provide spares, spare parts, and special tools for all stage lighting equipment if necessary for proper operation and maintenance of equipment.

1.11 COMPLETION

A. Provide all labor, engineering, design, testing, supervision, material and equipment required even though not specifically mentioned herein, so that when work is completed, an operable system will be turned over to the School. Any errors, omissions, or ambiguities are not to condition this requirement but shall be brought to the attention of the Owner in their possible effect on intent of this Specification.

B. Before operating any equipment for demonstration or test comply with manufacturer's preparation instructions.

C. Once equipment has been installed a factory authorized field service technician shall check and test equipment and make adjustments as necessary.

D. After checkout and adjustment, the stage lighting system shall be operated for approval of the School, Architect, and Theatre Systems Consultant.

E. If due to installation-caused matters the Architect or Theatre Systems Consultant are required to perform any follow-up checkout or inspection visits after the approved completion of the project, the Contractor shall compensate the Architect or Consultant at their standard hourly rates for all time expended.

1.12 WARRANTY

A. Guarantee all materials, equipment, and work against defects of any kind for a period of one year from written acceptance of the work.

B. Parts Warranty: Obtain guarantees and/or warrantees for factory assembled equipment and include with 'Operations and Maintenance Data'.

C. Replacement: In the event of failure of any work, equipment, or device during the life of the guarantee, at no cost to the School, repair or replace the defective work and remove, replace, or restore any parts of the structure or building which may be damaged as the direct result of the defective work or in the course of making the replacement of defective work or materials. Any work, equipment, or device replaced due to failure shall be guaranteed for a period of one year from date of replacement.

D. Make a minimum of two inspections with operations personnel, within the warranty period, at no expense to the School, to insure all systems to be in satisfactory operating condition. Submit a written report signed by operating personnel witnessing inspection to the School indicating inspection results with copies to the Architect and Theatre Systems Consultant.

E. The Contractor shall provide field service maintenance, at no cost to the School, within 24 hours of notification of system malfunction. This service response shall be in effect for a period of 12 months after the School's acceptance of the system.

1.13 INSURANCE

A. Provide full insurance against loss or damage during equipment shipment, storage, installation, and testing.

PART 2 - PRODUCTS

2.01 DIMMING SYSTEM

A. DIMMER RACKS

1. The dimmer racks shall be designed specifically for entertainment lighting, and shall consist of 6, 12, 24, or 48 dimmer module spaces. Dimmer rack shall be UL listed.

2. Rack set-up and preset data shall, as standard, be fully user programmable on a per rack or system wide basis.

3. Dimmer rack shall be a modular, freestanding cabinet. Cabinet shall be a welded, heavy gauge steel framework and be fully enclosed with removable panels and include a hinged, locking door over dimmer section. The dimmer rack shall allow for adjacent or back-to-back mounting of multiple racks. The rack shall be constructed to permit insertion and removal of dimmers and control modules without the use of tools. Finish shall be baked enamel over a primed surface.

4. Dimmer racks shall operate at 120/208VAC 3 phase, 4-wire + ground 60 Hz at a maximum of 800A per phase. Bussing across adjacent multiple racks shall be possible.

5. Load phase, neutral, and ground terminals shall, as standard accept up to a #6 gauge wire. An optional terminal adapter accepting up to #2 gauge wire shall be provided to minimize load voltage losses. Dimmer racks shall be braced for 50,000 amps. Provisions shall be made for optional amp trap devices to provide higher fault current protection, if required.

6. Dimmer rack shall be designed for up to 48 dual plug-in dimmer and/or nondim modules. Each module shall contain two 2.4KW dimmers or nondims, or one dual-

sized special purpose fluorescent dimmer, comprising a total of up to 96 dimmers per cabinet. Provide dimmer modules as indicated on Drawings.

7. Dimmer modules shall rest on mounting trays with guide rails to align dimmer during insertion. Cabinet shall be shipped without dimmers or mounting trays installed for ease of installation.

8. All dimmer input power and control wiring shall be factory wired with terminated load wires to terminals adjacent to each dimmer receptacle. A neutral buss shall also be furnished in cabinet.

9. Ventilation shall be provided using multiple low-noise fans. The fans shall maintain the temperature of all components at proper operating levels with dimmers at any load. Air shall flow over the surfaces of the heat generating components using a combination of convection and fan assisted airflow. Each rack shall be outfitted with a lockable door that does not impede airflow in any manner. Fans shall operate only when the lighting control console is activated.

10. Load terminations shall be clearly marked with the rack circuit number. Signal terminations shall be by plug-in screw terminals to facilitate contracting and servicing and shall be clearly labeled.

11. Provide a label for each dimmer rack with rack ID# and circuit # range contained within rack. Label to be attached near top of rack with mechanical fasteners, adhesive only fastening is not acceptable.

12. Provide spare modules as noted in schedule of quantities on project drawings.

B. DIMMER RACK CONTROL ELECTRONICS

1. The main dimmer control electronics shall be housed in one processor plug-in module. The dimmer control electronics shall have a direct Ethernet connection and shall accept (2) DMX512 protocol inputs.

2. All rack setup and preset data shall be stored in a non-volatile manner and may be transferred to a replacement control processor module without losing data.

3. The dimmer system shall support the following range of peripherals:

   a. Remote backup preset panels.

   b. Remote hand held programmers.

   c. Remote panels for architectural style channel and preset control of separate and independent zones of lighting.

4. Dimmer rack control electronics shall have the provision to select any circuit in the rack for activation by a Panic function. Panic function shall be activated by a remote contact closure.

5. Dimmer rack control electronics shall contain provisions for mapping DMX512 addresses from any of the three control inputs to circuits in that rack. Control electronics shall also support setting of minimum and maximum output levels, dimmer curves, non-dim operation, and direct dimmer level setting.

C. DIMMER MODULES

1. The dimmer modules shall be fully plug-in and factory wired. Dimmer modules shall be of rugged and heavy-duty construction. Power and signal pins shall be recessed in a self-aligning housing to avoid handling, storage, and insertion damage. A contoured handle shall be provided for ease of insertion and withdrawal. All chassis parts, except heat sinks and handle, shall be properly treated, primed and finished in fine texture, scratch resistant, gray powder coat paint. Each module shall be labeled with the manufacturer's name, catalog number and rating. Dimmer modules shall be UL recognized devices.

2. Dimmer modules shall be keyed so that dimmer modules of greater capacity shall not be interchangeable.

3. Each dimmer module shall contain one or two single pole circuit breakers, associated solid state switching modules, filters, power, and control components.

4. Dimmer electronics shall be completely solid state. They shall utilize two silicon controlled rectifiers in a back-to-back electrical configuration. The full load of the circuit is to be carried and controlled by the silicon controlled rectifiers.

5. Each dimmer shall be protected by a fully magnetic circuit breaker of the appropriate current rating and 10,000 AIC surge rating mounted on the face plate of the dimmer module so that the trip current is not affected by ambient or rack temperature. The circuit breaker shall be rated for tungsten loads having an inrush rating of no less than 20 times normal current and shall disconnect the power to the dimmer module before damage can be done to the dimmer power components. The circuit breakers shall be rated for 100 percent switching duty applications and shall be a UL recognized device.

6. SSR devices shall be encapsulated, epoxy filled high impact plastic cases with optically isolated firing circuits, control circuitry, and two silicon controlled rectifiers (SCRs). There shall be a minimum of 2,500 volts RMS of isolation between the AC line and the control lines of the SSR.

7. The SSR shall be in an industry standard format that is easily field replaceable without removing any other electrical or electronic devices.

8. Each dimmer module shall have an integral inductive filter, minimum **500** micro-second rise time, to reduce the rate of current rise time resulting from the SSR switching on. The filter shall limit objectionable harmonics, reduce lamp filament sing and limit the radio frequency interference on line and load conductors.

9. Special Purpose Modules

    a. Standard factory modules shall be available to provide dedicated non-dim circuits utilizing mechanical relays and not employing SSR devices. Each non-dim shall be provided with a primary circuit breaker of the appropriate rating. Non-dims shall be designed so they can be used for inductive loads.

    b. Standard factory modules shall be available to provide hard fired output for use with neon, cold cathode, and fluorescent loads. Hard fired modules shall provide a current source independent of the load current for the SCR Gate Drive Signal. Hard fired dimmers shall function independent of load as a result and shall drive loads of 1 watt or less.

    c. Standard factory modules shall be available to provide constant 120VAC voltage irrespective of control signal to dimmer racks.

    d. Standard factory modules shall be available that are capable of functioning as a dimmer, relay, or constant voltage breaker on either half of a dual module. Either of the three functions can be mixed or matched on either half of the module. Dimmer or relay functions can be remotely configured from the stage lighting control console or from the dimmer rack processor. The constant voltage function shall be manually activated at the dimmer module without the need for configuration at the dimmer processor.

D. RELAY RACKS

1. Relay racks shall be UL-listed enclosures containing 12, 24, or 48 pole breaker subpanels. Racks shall be constructed of 16 gauge galvanized steel and finished in a fine-textured scratch resistant paint.

2. Panel covers shall be available to support surface or flush mounting. Panel shall contain lockable door(s).

3. 1, 2, or 3-pole breakers or relays, up to 30A capacity, shall be supported in any combination within the panel.

4. A control interface shall be provided for panel setup and monitoring. Indicators shall be provided for power status, DMX status, network status, and rack errors. The panel shall support DMX512 and Ethernet network (sACN) control signals. The control interface shall support a USB memory stick interface for upload of configurations and software updates.

   a. Control interface shall support recording and playback of user-configured presets.

   b. Presets shall be able to be recalled via an astronomical time clock. Up to 50 events shall be supported.

   c. Individual relays shall be capable of being assigned a discrete control address on a circuit-by-circuit basis without the requirement for sequential addressing beginning from a rack start address.

5. The control electronics shall report the following information per branch circuit:

   a. Breaker state (on/off and open/closed).

   b. Current draw (amps)

   c. Voltage.

   d. Energy usage.

6. Branch circuit breakers shall feature a high inrush trip curve and shall not trip at full load. Relays shall utilize an integral mechanically held air-gap relay. All breakers shall feature integral current sensing.

7. A main breaker shall be an option to support the maximum feeder size for each size panel.

8. Provide means for connection of normal power sense feeds to other devices.

   a. Provide a 15A 3-pole circuit breaker in for connection of EM sense feed from ELTS.

   b. Provide a bus bar mounted tap kit with fuse holder for connection of sense feed from EBDK.

9. Basis of design: Electronic Theatre Controls Sensor IQ Series.

E. PORTABLE DIMMER DEVICES - 1 CHANNEL DIMMERS

1. Portable dimming modules shall be comprised of one 750 watt dimmers packaged in an enclosure suitable for mounting to the yoke of incandescent-lamped theatrical spotlights.

2. The dimming module enclosure shall include provisions for pipe mounting brackets as well as wall mounting brackets and shall contain handles for ease of carrying.

3. Each dimming module shall be powered by a 20A 120VAC one-phase electrical service.

4. The dimmers shall be compatible with the USITT DMX512/1990 control protocol and the dimming control input shall be optically isolated. Each dimmer module shall include 5-pin XLR DMX512 input and thru receptacles.

5. Each dimming module shall include a processor with local controls mounted on its enclosure. The functions available at the local controls shall include selection of the starting DMX address, setting dimmer levels.

6. Dimmer output voltage transition time shall be not less than 450 microseconds.

7. Dimming modules shall be convection cooled, and shall operate without cooling fans or filters. Each dimming module shall produce little or no mechanical noise.

8. Dimmer modules shall be UL listed and labeled.

9. Provide each dimming module with the following accessories & options.

   a. Dimmer outputs shall be via 20A grounded stage pin connectors on flexible cable.

   b. 5-20P input connector on 12” long flexible cable attached to module.

   c. (1) 15’ portable DMX512 control extension cable with heavy-duty jacket and black Neutrik 5-pin XLR connectors with gold plated contacts (TMB ProPlex PC224P or equal). Provide DMX512 extension cable fabricated per criteria noted in the extension cable portion of this specification section.

   d. Pipe mounting hardware kit suitable for attachment to a theatrical fixture yoke.

10. Provide quantity and type of dimming modules and accessories as indicated in the schedule of quantities on Project Drawings.

11. Acceptable products:

   a. E.T.C. #ES750.

   b. Strand Lighting Light Pack dimmer

2.02 EMERGENCY LIGHTING & POWER DISTRIBUTION

A. EMERGENCY LIGHTING TRANSFER SYSTEMS

1. Provide (1) UL 1008 code rated emergency lighting transfer relay panel to switch dimmed and nondimmed lighting circuits to emergency power in the event that the normal power supply to the stage lighting system fails. Features include:

   a. The transfer panel shall provide dimmer pass-through for normal operation.

   b. The panel shall be wall or floor-mounted, separate from the dimmer racks.

   c. The transfer panel shall be configured to accept a single 120/208VAC 3-phase emergency power source or individual emergency branch circuits, type per project drawings. The source voltage settings shall be field adjustable for either single or three phase power.

   d. The panel shall have a quantity of 20-amp circuits for transfer switches sufficient to supply emergency power to all applicable circuits as indicated on electrical drawings.

   e. The panel shall have voltage sensing of normal supply lines and automatic retransfer of power on restoration of normal supply.

   f. An integral test switch shall be provided to simulate normal power source failure for periodic verification of system operation. The test switch shall be accessible without opening the panel.

2. Provide DMX Emergency Bypass Controller(s) (DEBC) to bypass the DMX control signal and drive all connected loads to full in a loss-of-power or emergency situation.

   a. Bypass controller shall accept a contact closure input that will drive a single universe of DMX512 to full or to a preset level when activated. Bypass controller shall not process the DMX512 signal when in Normal input mode.

   b. Bypass controller shall contain an LED indicator on exterior of unit signaling normal state or bypass state. Controller shall contain internally

accessible DIP switches for configuration o DMX record mode, Contact Input Type, and Wait Time for Restore of incoming DMX.

3. Provide an Emergency Bypass Detection Kit (EBDK) for monitoring normal 3-phase power feed to dimming system and providing a maintained contact closure output upon loss of power to trigger other lighting bypass controller(s).

4. Connect normal power sense feeds in relay rack as required.

   a. Connect ELTS EM sense feed to a 15A 3-pole circuit breaker in relay rack.

   b. Connect EBDK sense feed to a bus bar mounted tap kit with fuse holder in relay rack.

B. DIMMER-CIRCUIT DISTRIBUTION EQUIPMENT

1. Provide stage lighting circuitry connector strips and plug boxes as shown on the stage lighting drawing documents.

   a. Each connector strip and plug box shall be provided with screw terminal strips for feed connections, mounting bracket devices, and basket weave strain-relief multi-cable connectors where necessary.

2. Provide all necessary mounting hardware for pipe or surface mounted strips and boxes as detailed on project drawings.

3. Backboxes for all plug boxes shall be provided by stage lighting manufacturer unless noted otherwise on project drawings.

4. Plug boxes shall have two sets of knockouts on each of the sides.

   a. Production dimmer and relay circuits shall utilize grounded stage pin connectors or 5-20R connectors as indicated on project drawings.

   b. Rehearsal light circuits shall utilize L5-20R connectors.

   c. Dimmable running light circuits and non-switched 120VAC power shall be supplied to connector strips and plug boxes via pigtail or panel mount 5-20R receptacles.

5. Exterior finish shall be flat, black baked enamel. Custom colored finishes shall be required if indicated on project drawings.

6. Circuit identification numbers shall be securely affixed to one or both sides of the plug strip as indicated on project drawings. Numbers shall be engraved lamacoid tags, white letters on black background and shall be secured via rivets or other mechanical fasteners. Adhesive-only fastening is not acceptable.

C. MULTICONDUCTOR CABLE AND CABLE ACCESSORIES

1. Provide U.L. rated flexible #12-AWG multiconductor cable for connecting each stage electric batten connector strips with the gridiron or ceiling junction boxes. Cable shall have bare copper conductors, PVC color-coded insulation, and black PVC or rubber jacket. Each cable shall have the proper code rated number of conductors for separate hot and neutral circuits and mechanical ground wiring. The Electrical Contractor must verify field conditions and coordinate with the Rigging Contractor to determine lengths and quantities of multiconductor cables required before placing an order for cable. See stage rigging drawings for arrangement of rigging for lighting battens.

2. Provide closed-sleeve multiweave stainless mesh type support grip devices with integral eye equal to Kellems Support Grip for vertical downward loads of multiconductor cables. Attach support grip devices to building structure using securely connected bales or eyes.

3. Provide strain-relief grip device with cord connector and integral closed-sleeve multiweave stainless mesh equal to Kellems Grip for vertical or lateral loads at

each end of multiconductor cables. Attach strain-relief devices securely to connector strips or plug boxes with integral cord connector.

4. Cable cradles shall be supplied by the Stage Rigging Contractor. Coordinate size and quantity of multi-cables and installation with Stage Rigging Contractor.

5. Coordinate the multiconductor cable and strain-relief sizes to verify that they fit into the available space on the connector strip terminal compartment and at ceiling or gridiron junction boxes.

D. COMPANY SWITCH

1. Provide Theatrical Systems Company Switch as described herein and as shown on Theatre Systems Consultant's Drawings and Electrical Drawings.

2. Company Switch configuration shall be 120/208V, 3-phase, 5-wire, amperage as noted on Project Drawings. Lighting System Company Switches rated 200A or greater shall have double neutrals.

3. Enclosure shall be a NEMA 1 wall mounted enclosure fabricated with a 14 ga. steel and finished in a black epoxy paint. The Company Switch must satisfy requirements of NFPA 70 Article 384 and Article 520. The Company Switch shall be UL listed and labeled.

4. Provide a front door panel to protect circuit breaker controls. There shall be no access to live electrical conductors when the door is open.

5. 3-phase, 120/208VAC company switch assemblies shall be provided with connectors by Cam-Lok, Leviton or equal, compatible with industry standard Cam-Lok E1016 devices, six connectors including double neutrals.

6. Company switch shall also contain a connection chamber for connection with bare wire to copper bus bars. Load connection busbars shall contain (2) 3/8"-16 x 1" bolts and (1) dual rated solderless lug for cable connection. When open, the hinged door shall trigger a shunt-trip mechanism that will trip the breaker.

7. Main breaker shall be UL listed, 3-pole, 100% equipment rated, continuous duty circuit breaker with a minimum AIC rating of 65,000A. Enclosure shall be Hi-Pot tested at 1250VAC for a period of no less than 10 seconds.

8. All connections from Main Circuit Breaker to output panel shall be by copper bus. All bus sizes shall be based on a current density no greater than 1,000 amperes per square inch.

9. All internal noncurrent-carrying metal parts shall be grounded to the main chassis frame.

10. Enclosure shall contain a neon indication lamp to indicate voltage present on each phase leg and a neon lamp to indicate ground integrity.

11. Company switch shall be labeled, 'THEATRICAL LIGHTING SYSTEMS COMPANY SWITCH' along with amperage.

12. Acceptable Manufacturers:

a. Electronic Theatre Controls - Powersafe Pro

b. Lex Products Corp.

c. ESL Power Systems

d. Others contingent on approval by Theatre Systems Consultant.

2.03 STAGE LIGHTING CONTROL SYSTEM

A. STAGE LIGHTING CONTROL DATA NETWORK DEVICES

1. Provide Ethernet and DMX512 data network control and distribution devices as described herein. All devices connected to the ethernet data network shall be compatible with the lighting control console and any other lighting control devices connected to the ethernet network. All connected ethernet devices shall support 10BaseT and utilize Neutrik EtherCon RJ-45 connectors for data connections. All DMX512 and Ethernet network components shall be compatible with the following ANSI Standards:

    a. ANSI E1.11 - Entertainment Technology USITT DMX512-A - Asynchronous Serial Digital Data Transmission Standard For Controlling Lighting Equipment and Accessories.

    b. ANSI E1.20 - Entertainment Technology RDM - Remote Device Management Over DMX512 Networks

    c. ANSI E1.31 - Entertainment Technology - Lightweight Streaming Protocol For Transport of DMX512 using ACN.

2. Provide all control wiring and control cables for a complete functioning system so that all control and dimming components, except portable lighting fixtures, can be interconnected and tested at the time of system commissioning.

3. Provide portable control cables as required to connect ceiling or gridiron junction boxes with operable stage lighting batten connector strips as indicated on project drawings.

    a. Cables for Ethernet network signals shall be constructed from a heavy duty cable constructed to ISO/IEC 11801 CAT5e standards. Cable shall be supplied with Neutrik Ethercon connectors at each end. Cable shall be TMB ProPlex PCCAT5EP or pre-approved equal.

    b. Cables for DMX512 signals shall be constructed from a heavy duty, double shielded low capacitance cable suitable for RS422/RS485 applications. Cables shall be supplied without connectors at each end if distribution devices have terminal strips for data connections, otherwise cables shall be supplied with Neutrik XLR 5-pin connectors with gold contacts. Cable shall be TMB ProPlex PC224P or pre-approved equal.

B. CONTROL RECEPTACLE STATIONS AND JUNCTION BOXES (CRS)

1. Control receptacle stations shall contain locking data-grade connectors and be provided with appropriately sized surface-mounted electrical back boxes unless noted otherwise. The faceplates shall have engraved nomenclature filled with contracting paint color for all connections. Ethernet connectors shall be Neutrik EtherCon RJ-45. Provide control receptacle stations with receptacles as indicated on Theatre Systems Consultant's drawings.

2. All connectors shall utilize screw terminal or punchdown connections for termination of installed wiring, field soldering of connections is not acceptable.

3. Control data junction boxes at ceiling or gridiron level shall be placed adjacent to junction boxes for power circuits.

    a. Junction boxes for Ethernet network signals shall utilize Neutrik Ethercon receptacles to connect portable cables between ceiling/gridiron and stage lighting batten connectors strips below.

    b. Junction boxes for DMX512 signals shall contain data grade quality terminal strips. The junction boxes shall include integral cord connectors with strain-reliefs to resist lateral loading on the cables.

    c. Gridiron control junction boxes with network ports shall include label with network port #. Provide port # labeling at each end of flexible data cabling between gridiron receptacles and connector strip receptacles. Provide port # at receptacles where flexible cable enters connector strips.

4. Provide labels with unique port ID numbers corresponding to patch panel for every Ethernet network receptacle in the system. On the same label with port # provide maximum extension cable length for use with portable extension cables based on a 330 foot maximum network segment length. Label shall be an engraved Lamacoid tag with white characters on a black background.

5. All Lamacoid labels for network port #'s and maximum cable lengths shall be screwed or riveted to receptacle facepanels. Adhesive only fastening will not be acceptable. Pre-drill facepanels at factory at time of fabrication for ease of label installation onsite once extension cable lengths have been determined.

6. Provide floor pocket for CRS-devices as indicated on contract documents.

   a. Floor pocket basis of design: FSR FL600-6 series.

   b. Provide inserts and cover as shown on drawings.

C. CONTROL EQUIPMENT RACKS

1. Provide floor or wall-mounted control equipment rack(s) for housing selected components described in this section and as noted in contract drawings.

2. Control equipment rack shall be a 16-gauge steel wall-mounted enclosure with provisions for a locking front door. The front door shall be solid or with a plexiglas insert per drawings. Doors shall be easily removable in the field. Plexiglas doors shall be reversible to hinge on the left or right side in the field. The side and rear panels shall contain louvered vents. Provide 5 sets of keys to the owner. When multiple racks are indicated they shall be keyed alike.

   a. CER-2 rack containing the SMP control station shall be Middle Atlantic SWR-series shallow wall rack with PFD-xx door.

3. The rack shall contain 2 pair (front and rear) of 11 gauge CRS mounting rails predrilled for #10-32 screws on standard EIA 19" spacing. Both sets of rails shall be adjustable from front to back. Provide screws sufficient to fasten all devices mounted in rack including blank cover plates and vent panels.

4. All devices within rack shall be powered via UPS mounted in rack. Provide additional power strips, as necessary, connected to UPS and designed to securely mount inside rear rails of rack.

5. Control equipment racks located in the stage areas or areas in or adjacent to the auditorium, seating area or control rooms shall only utilize a UPS power source if there are system control devices in the rack requiring 120VAC power. In this case the UPS shall be passively cooled with no fan noise or power shall come from a remote power source.

6. The rack shall be designed for single-phase 2-wire with ground operation at a maximum of 20 amps, 120 volts 60 Hz AC.

7. The rack shall be designed to allow for easy insertion and removal of all components, and for convenient access to all rear-mounted power and control connections.

8. The rack shall contain a minimum of 3 open rack spaces to accommodate future control devices. Provide solid blank panels for all empty spaces.

9. Provide labels on all devices in equipment rack if necessary to define function or where control signals are fed from. Devices requiring labels include Ethernet nodes, DMX repeaters, and others as indicated on project drawings.

10. Items contained in the control equipment racks shall include but are not limited to:

    a. Ethernet switch(es).

    b. CAT-5 cable management panel(s).

    c. Ethernet patch panel(s).

d. Ethernet port label panel(s).

e. DMX512/Ethernet nodes as required.

f. DMX512 Repeaters as required

g. Stage Mangers Panel.

h. A digital clock and timer panel.

i. Adjustable panel mounted 12" LED gooseneck worklites with rotary dimmer knob (Littlite #RL-10-D-LED or equal).

j. Storage drawers.

k. (1) UPS device.

l. (lot) blank or vent panels as required.

m. Architectural Lighting Control System Processor (see below.)

D. ETHERNET SWITCH(ES)

1. Provide high-speed multiport Ethernet switch(es) suitable for use with the stage lighting control console and related ethernet nodes.

a. Ethernet switch(es) shall contain a minimum of 24 ports. All connectors shall be located on the front of the unit.

b. The switch shall have, located on the front panel, indicator status lights for each port as well as for general network and hub status.

c. Switch(es) shall be mounted in equipment rack 'CER-1'. Rack-mounting ears shall be provided.

d. Ethernet switch(es) shall provide Power-over-Ethernet, PoE, based on the IEEE 802.3af standard.

e. Provide a quantity of Ethernet switches as required, sufficient to support system design as indicated on contract drawings.

E. ETHERNET PATCH PANEL

1. Provide Ethernet patch panel(s) for terminating Category-5 ethernet wiring from field devices.

2. The patch panel(s) shall contain a quantity of ports sufficient to connect all field wiring devices. Minimum of 12 ports per patch panel. If all slots in patch panel are not required provide (5) spare, un-used RJ45 panel mount connectors for future expansion.

3. Patch panel(s) shall be mounted in equipment rack 'CER-1'.

4. Provide separate 1RU blank panel(s) for labeling patch panel ports. Label each port with a unique I.D. label indicating port # and location for all Ethernet jacks connected to field wiring devices.

5. Provide a sufficient quantity of CAT-5 patch cables to connect all field wiring devices to Ethernet switch(es) plus (5) spare cables. Provide red patch cables for all devices that are to remain permanently connected for basic system functionality including dimmer, racks, architectural control processor, hard wired LCD stations, and installed Ethernet nodes.

6. Provide rack-mounted cable management panel(s) for dressing of patch cables between patch panel and Ethernet switch(es).

F. UNINTERRUPTIBLE POWER SUPPLY (UPS)

1. Provide (1) rack-mounted uninterruptible power supply (UPS) for use with the control data network devices located within the control equipment rack. The UPS

shall be sized to power all equipment installed in the rack with an allowance for future equipment but shall not be rated for less than 450 watts.

G. DMX512 REPEATERS (RACK MOUNTED)

1. Provide DMX512 multiport repeaters with sufficient quantity of output ports to support all DMX512 outputs as indicated on project drawings.
2. There shall be 2,500 volt electrical isolation between all input and output sections and between all adjacent outputs. There shall be 4,000 volt electrical isolation between mains power supply and low voltage control electronics. DMX512 repeaters shall contain no fuses, all data links shall be self-resetting in the event of an error condition.
3. All control connections shall be made via screw terminal block assemblies.
4. DMX512 repeaters shall contain rack ears or provisions for mounting in standard EIA 19" equipment racks.
5. There shall be LED indicators for each output indicating power, DMX512 present, and transmit data.
6. DMX512 repeater signal protocol shall be E1.20 RDM & E1.11 DMX512A compliant.

H. DMX512 to 0-10V INTERFACE

1. Provide DMX512-to-0-10 volt interface for control of 0-10V lighting fixtures.
2. Interface shall contain twenty-four (24) analog outputs and a DMX512 input and pass thru connection with selectable end-of-line termination switch.
3. Interface shall be suitable for DIN rail mounting and shall include an associated 120VAC power supply. Provide complete assembly in a rack tray suitable for mounting in a 19 inch equipment rack.
4. Converter shall be RDM discoverable and configurable.
5. All connections shall be via pluggable screw terminals.
6. Interface shall be selectable for 0-10, 0-15, 0-2.5, & 0-5V output modes. Current sinking output shall be possible. Interface shall support 10mA current source per channel and 30mA current sink per channel.

I. ETHERNET NODES

1. RACK MOUNTED DMX512-TO-ETHERNET NODES
   a. Provide rack-mounted DMX512-to-Ethernet nodes for distribution of control signals to/from field devices as shown on Theatre Consultant's drawings. Rack-mounted DMX512-to-Ethernet Nodes shall be provided with the following features:
      1) ANSI E1.11 (DMX512-A), E1.20 (RDM) and E1.31 (sACN) compatibility.
      2) LCD screen for displaying status and configuration information.
      3) RJ-45 Ethernet receptacle on rear of unit or integral to circuit board.
      4) (2) DMX512 receptacles per node configured as outputs or inputs. Ports shall be fully configurable via software provided by the Manufacturer.
      5) Nodes shall be capable of PoE Power-over-Ethernet operation.
2. PANEL MOUNTED DMX512-TO-ETHERNET NODES

a. Provide panel mounted one-port, DMX512-to-Ethernet nodes, user configurable as an input or output, as shown on Theatre Consultant's drawings.

b. Node shall be capable of PoE operation, shall fit in a standard single gang deep backbox, and shall mount with standard Decora-style faceplates.

c. Node shall utilize an XLR5 male or female connector and shall contain signal indicators for Network and DMX512 status.

d. Node shall support multiple protocols including E1.31 Streaming ACN [sACN/Net3], ArtNet, Pathport Protocol, ETC Net3, Strand ShowNet.

3. PORTABLE DMX512-TO-ETHERNET NODES

a. Provide portable DMX512 Ethernet pipe-mount nodes for connection to the stage lighting control network. DMX512 Ethernet Nodes shall be provided with the following features:

1) ANSI E1.11 (DMX512-A), E1.20 (RDM) and E1.31 (sACN) compatibility.

2) LCD screen for displaying status and configuration information.

3) (1) Neutrik EtherCon RJ-45 Ethernet receptacle.

4) (2) DMX512 receptacles configured as Outputs or Inputs. Ports shall be fully configurable via software provided by the Manufacturer.

5) Nodes shall be capable of PoE Power-over-Ethernet operation.

6) Pipe Clamp, mounting hardware, and safety cable for attachment to lighting pipes or handle with mounting hardware for desktop or surface mount applications.

b. Temporarily connect nodes at field locations to ensure functionality of node with system. Return portable nodes to owner after system checkout, acceptance, and training.

c. Refer to schedule of quantities on project drawings for types and quantities of nodes.

4. All Ethernet-to-DMX nodes throughout system shall be from a single manufacturer and shall be configurable from a single software program.

5. PORTABLE VIDEO ETHERNET NODE

a. Provide (1) portable table-top Video Ethernet Node for remote video connection to the main lighting control console. Remote video node shall be provided with the following:

1) (1) UTP 10Base-T Ethernet port.

2) Ports for connection of (2) Video Monitors. Video ports shall be configurable via software provided by the Manufacturer.

3) Ports for connection of (1) Keyboard, and (1) mouse.

4) LED indicator for display of power and network activity.

5) (1) Full-size PC Keyboard and mouse.

6) (2) 21" LCD flat-panel touchscreen display monitor(s).

b. If the Stage Lighting Manufacturer's lighting console only supports a wireless video node in the form of a laptop computer, then the following accessories shall also be supplied:

1) A quantity of Wireless access points and mounting hardware required to provide a strong signal to the computer at any location in the auditorium, backstage, and control room areas.

2) (1) laptop computer with a minimum 15" display and included wireless card or built-in wireless capability.

3) A lockable hard carrying case with space for computer, power supplies, cables, and accessories. Carrying case to include permanently attached label: 'VIDEO NODE.'

4) The laptop computer video node shall support an external video display. (1) external 22" LCD monitor shall be provided in addition to the LCD integral to laptop computer.

5) Any additional accessories or items required to provide a complete and operational remote video node shall also be supplied. All original manuals and software (on CD-ROM or DVD) supplied with computer shall also be provided.

J. STAGE LIGHTING CONTROL CONSOLES

1. Provide (1) stage lighting control console 'CC-1'. The control console shall support the following minimum requirements:

a. 2,048 DMX512/RDM outputs via XLR5 connections, 16,000 control channels.

b. Minimum 10,000 cues, 999 cue lists, 1,000 groups, 10,000 Macros, 1,000 effects, 900 cue lists.

c. 1000 Palette presets for each of 4 moving light attribute groups

d. 1 master playback fader with support for up to 200 virtual playback faders with fully independent cuelists. Tracking and cue-only operation.

e. 20 Submasters (minimum).

f. Connections for (2) external DVI or VGA 1280x1024 video displays.

g. 4 rotary encoders for control of automated lighting functions.

h. Attribute library support for automated lights.

i. Onboard editing function to allow user to add new fixtures to the attribute library.

j. Color picker function for color-changing lights.

k. Data storage via 40GB internal hard drive or via USB flash drive.

l. Automated lighting control support. Attribute library support for automated lights including an onboard editing function to allow user to add new fixtures to the attribute library.

m. Wireless Remote Focus Unit (WRFU) support via lighting network.

n. Offline editing software for creation and editing of control console show files.

o. Console facepanel and processor shall be a single integrated unit.

p. Basis of Design Products

1) Electronic Theatre Controls, Ion Xe20-2K.

2) Strand Lighting, Neo, 2,000 channel, with fader wing utilizing 20 submasters.

2. Provide nominal 24" LCD flat panel video display monitor(s) with touchscreen capabilities and dust covers for use with 'CC-1'.

a. Monitor quantity per Project Drawings.

3. Provide (1) uninterruptible power supply (UPS) for use with the stage lighting control console 'CC-1'. The UPS shall be sized to power the control console and (2) LCD monitors. The UPS shall be suitable for floor or desk-top mounting. UPS shall be passively cooled, no fans or other noise generating devices shall be included.

4. Provide all related cables and accessories needed for a complete operating system that integrates the new stage lighting control and dimming system. All cables to be constructed from high quality data cable suitable for repeated flexing and portable operation, ProPlex or equal. These cables and accessories include but are not limited to:

   a. (1) 15' CAT-5 data cable with RJ-45 connectors (for 'CC-1')

   b. (1) 15' DMX512 data cable with XLR5 connectors (for 'CC-1')

   c. (2) Console 18" gooseneck dimmable 'Littlite' or equal dimmable LED worklights. Lights shall either securely attach directly to console via an XLR or BNC-style connector or if detached Littlites they shall include a weighted base suitable for tabletop use.

      1) Detached dimmable Littlites shall be model #MV-18-LED with #CWB cast weighted base

   d. Control console dust covers and video display dust covers.

   e. (1) Keyboard and (1) mouse for control console.

   f. (2) 8GB USB flash drives for storing show and system information for 'CC-1'.

K. WIRELESS REMOTE FOCUS UNIT

1. The WRFU shall be a portable hand held touchscreen device for remote connection to the primary control console. Software for use on device shall be provided and installed prior to system checkout and training. Device shall utilize an 8 inch capacitive multi-touch display and shall be mounted in a rugged enclosure. Remote focus unit capabilities shall include:

   a. Console programming functions including playback, parking, and patching of channels.

   b. Direct selects and playback controls.

   c. Color picker for selected fixtures

   d. Rechargeable battery.

2. WRFU should be supplied with the following:

   a. Hand strap

   b. Charging cable/adapter

   c. USB Hub

   d. Office docking cradle with stand

   e. EETi Stylus Pen

3. Provide a wireless access point (WAP) that is PoE powered for use in providing wireless connectivity between control console and Android or iOS devices (tablets and phones) as well as wireless remote focus unit noted above.

4. If manufacturer's wireless remote utilizes a proprietary wireless base station provide an additional WiFi base station that is PoE powered for use in providing wireless connectivity between control console and Android or iOS devices (tablets and phones).

2.04 ARCHITECTURAL LIGHTING CONTROL SYSTEM

A. The Architectural Lighting Control System shall control the following components and functions:

1. Houselighting Control for dimming of the permanently installed house light fixtures located in the auditorium.
2. Worklighting Control for switching of all permanently installed worklight fixtures located backstage, in the box boom and front catwalk areas.
3. Rehearsal Lighting Control for dimming of all portable lighting fixtures mounted in the FOH catwalk and on the stage lighting electric battens over the stage.
4. Running Light Control for dimming of permanently installed performance run light fixtures in the backstage stage area and for receptacles for portable run light circuits as indicated on project drawings.
5. Stage Preset Lighting Control shall provide the capability to record and playback scenes that have been created with the stage lighting control console. Playback of scenes shall be possible without the aid of the control console.

B. The Architectural Lighting Control System shall not utilize control stations that are addressed using rotary encoders, DIP switches or other physical means at the individual station.

C. Provide station power modules or repeater modules in sufficient quantities to support the number of control stations and layout as shown on project drawings.

D. The Architectural Lighting Control System shall support the following system functionality:

1. System shall support creation and scheduling of real time events via a network connected PC with a web browser. Real time events shall also be able to be created, modified, and monitored from LCD stations connected via the Stage Lighting Ethernet network.
2. Houselight presets and stage presets shall have user-configurable fade times adjusted from a single page on any of the LCD stations via a password protected setup page. House or stage presets shall operate with the same fade time regardless of where they are recalled from, this includes multiple LCD pages, hard buttons on the SMP, or hard buttons on the PCS devices.
3. Run light circuits shall include the capability to set a maximum level via a level fader on a password protected setup page. Run light circuits can then be toggled on and off via a single button per circuit without the level exceeding the maximum set on the fader.
4. Logic shall be incorporated to manage power supply circuits for DMX512-controlled houselights. Features shall include:
    a. Power supply circuits shall be turned on if any DMX control channel is above 0%.
    b. Power supply circuits shall automatically turn off after a pre-determined time if no houselight DMX control channels are above 0%.
5. The portable control stations (PCS-x) shall reflect the current state of circuits and presets in the system when re-connected to system receptacles.
6. The system shall support the ability to separately lockout remote houselight stations (HCS-x) and remote worklights control stations (WCS-x) from any LCD screens in the system. When remote stations are locked out they shall exhibit behavior to indicate they are in a different state. Indications could include the button changing color or button illumination blinking several times.

7. The system shall support group functionality of circuits such that a single button on a station or page of LCD station shall be able to control circuits that are individually switchable via other stations or LCD pages. The group button shall then be able to reflect a mixed state when all circuits within the group are not in the same state by changing the button illumination to another color (amber).

8. The system shall allow any button, fader, or object on an LCD page for physical station to be in any space or room within the system configuration. Any button or object shall also be able to be excluded from room/space all off or global all off commands.

9. The system configuration software shall have the ability to create full pages of mult-line text with system information and operating instructions.

E. STAGE MANAGER'S CONTROL PANEL ('SMP-1')

1. Provide an integrated Stage Manager's Panel 'SMP-1' that consists of separate control sections for Houselights, Worklights, Rehearsal Lights, Run Lights, and Stage Preset pushbuttons. The panel shall be a dedicated enclosure and shall contain physical faders & buttons as well as a 7" color LCD touchscreen display.

2. The Stage Manager's Panel shall provide the following capabilities and requirements for the facility:

   a. Houselight Control: Houselight area controls via physical zone fader controls with a master fader, take-control/manual button and a preset record button for houselight circuits.

   b. Worklight Control: Control of non-dimmable worklights along with all-off functions for worklight circuits via pushbutton controls with LED indicators.

   c. Rehearsal Light Control: Control of the rehearsal light circuits, all-off functions for rehearsal light circuits via pushbutton controls with LED indicators.

   d. Run Lights: Control of hardwired and portable run light circuits via pushbuttons. A master intensity fader for dimmable run light circuits shall be provided as a fader on a setup page on the LCD stations.

   e. Stage Preset Control: Recording and playback of stage lighting via user recordable DMX snapshots. Stage Presets shall be snapshots assigned to pushbuttons.

   f. Lockout control of all remote entry stations.

3. The LCD touchscreen display shall mimic all functions available as physical faders and buttons on the 'SMP-1' panel. The LCD shall also provide for additional functionality not available with physical controls including monitoring of real time events created in the architectural control system. Programming of LCD pages shall be submitted and reviewed with Theatre Systems Consultant 2 weeks prior to system commissioning.

4. Provide instructions for recording Houselight & Stage presets as well as general operation of architectural lighting control system. Instructions shall be provided as user selectable help screens on the 7" LCD touchscreen.

5. The Stage Managers Panel shall be constructed as a shallow surface mounted enclosure and shall also contain the following components:

   a. A digital clock and timer panel.

   b. Adjustable panel mounted LED gooseneck worklites with dimmer switch (Littlite or equal).

   c. Locking door with clear Plexiglas insert. Door shall be removable and the hinge side shall be reversible in the field.

F. PORTABLE CONTROL STATIONS (‘PCS-1’ & ‘PCS-2’)

1. Provide portable, table-top mount control consolettes with control capabilities and features identical to those of the Stage Manager’s Control Panel (‘SMP-1’). See above section ‘STAGE MANAGER’S CONTROL PANEL (‘SMP-1’)’.

2. The ‘PCS-1’ consolette shall control houselights via physical faders and pushbuttons for presets. Fade rates for presets shall be user adjustable via a setup page on the Architectural Lighting LCD screens at ‘SMP-1’ or ‘PCS-2’ stations.

3. The ‘PCS-2’ consolette shall be a tabletop LCD station with a 7” color touchscreen control panel which replicates all control functions present at ‘SMP-1’. Buttons presses and control logic between stations shall mimic each other at the two stations. PCS-2 shall be a low profile station with a sturdy base and an angled face measuring not less than 30-degrees from horizontal for legibility of the LCD screen when seated at the control room counter or similar table.

4. Provide with (1) 15’ and (1) 50’ portable control cable with positive lock quick disconnect multipin connectors at each end for connection to control receptacle stations as indicated on project drawings and in project specifications.

G. HOUSELIGHT CONTROL STATIONS (HCS)

1. Provide prewired house pushbutton stations with appropriately sized back boxes to control the house lights. 1 momentary contact pushbutton with LED indicator light shall be provided to take control and turn on and off the house lights to a preset intensity level (cleanup preset). The control stations shall be suitable for flush mounting in standard electrical back boxes and shall include smoked Plexiglas hinged covers with magnetic catches. The faceplates shall be engraved with appropriate identification.

H. WORKLIGHT CONTROL STATIONS (WCS)

1. Provide prewired worklight pushbutton stations with appropriately sized back boxes to control the stage worklights. 1 momentary contact pushbutton with an LED indicator light shall be provided for each control circuit to turn on and off the work or rehearsal light circuits. The faceplate shall be engraved with appropriate identification. The stations and labels are indicated on the project drawings. Stations shall have smoked Plexiglas hinged covers with magnetic catches where indicated on project drawings.

I. CONTROL PROCESSOR FOR ARCHITECTURAL LIGHTING SYSTEM

1. The control processor for the Architectural Lighting System shall be mounted in the control equipment rack (‘CER-1’). The control processor shall be designed for single phase 2 wire with ground operation at a maximum of 20 amps, 120 volts 60 Hz AC. The control processor shall have the following characteristics and requirements:

2. Interface electronics for controlling all house light dimmers, worklight nondims, rehearsal light nondims, and the stage presets control system shall be mounted in the control equipment rack

3. The control processing device shall have a control module with a multi-character display and keypad for system configuration. The control module shall have a memory card slot for storing the system configuration.

4. All control connections shall be terminated via factory provided plug-in connectors.

2.05 STAGE LIGHTING FIXTURES

A. Provide stage lighting instruments as indicated on the schedule of quantities on project drawings.

B. All stage lighting instruments shall be provided with the following accessories:

1. Pipe-mounting C-clamp (except followspots and floor-mounted instruments) and hanger brackets if yoke is not integral to instrument.
2. Floor trunions for floor mounted fixtures.
3. Color filter frame and 30” wire-rope safety cable with snap link closure.

C. Provide full-color LED profile spotlights suitable for long throw applications [production spotlights]. Fixtures shall include the following:

1. Die cast all metal housing with shutter barrel, double clutch locking yoke. Shutter barrel shall contain accessory slots for use with templates (glass or steel), iris, or special effect devices. Provide with a black finish.
2. Full color LED light engine that utilizes one of the following LED arrays:
   a. RGBIL: Red-Green-Blue-Indigo-Lime
   b. RGBALC: Red-Green-Blue-Amber-Lime-Cyan
   c. RGBL: Red-Green-Blue -Lime
3. Built-in power supply with input voltage range of 100-240VAC, on-board processor, (60) Luxeon LED emitters with a minimum 50,000 hour L70 lamp life. Greater than 8,000 output lumens.
   a. Theatrical grade dimming with a 15-bit virtual dimming. Low noise cooling via a variable speed, temperature controlled or user controllable fan.
4. Power in and thru via powerCON TRUE1 or powerCON connectors. Power leads shall use a 5’ long powerCON-to-5-15P connector. DMX512 input and through connectors via 5-pin XLR connectors.
5. Enhanced definition lens tubes and/or barrel assemblies of various beam widths or zoom ranges per schedule of quantities on project drawings. Lens tube or barrel shall include accessory slots with locking capability for two accessories (gel frames, top hats, etc.). A soft focus diffuser shall be provided for each fixture for use in shutter barrel accessory slot.
6. Acceptable products:
   a. E.T.C. ColorSource Spot V
   b. Vari-Lite Leko LED
   c. Altman Phoenix PHX3.5
   d. Others contingent on pre-approval.

D. Provide full-color LED wash lights with variable zoom suitable for long throw applications [production wash lights]. Fixtures shall include the following:

1. Die cast all metal housing, double clutch locking yoke. Fixture body shall contain accessory slots with locking capability for two accessories (gel frames, top hats, etc). Provide with a black finish.
2. Full color LED light engine that utilizes one of the following LED arrays:
   a. RGBIL: Red-Green-Blue-Indigo-Lime
   b. RGBW: Red-Green-Blue-White
   c. RGBL: Red-Green-Blue -Lime
3. Built-in power supply with input voltage range of 100-240VAC, on-board processor, (44) LumiLED Luxeon LED emitters with a minimum 50,000 hour L70 lamp life. Greater than 5,000 output lumens. Theatrical grade dimming with a 15-

bit virtual dimming. Low noise cooling via a variable speed, temperature controlled or user controllable fan settings.

4. Power in and thru via powerCON TRUE1 connectors. Power leads shall use a 5' long powerCON-to-5-15P connector. DMX512 input and through connectors via 5-pin XLR connectors.

5. Optical system shall utilize a motorized zoom with a range of 15-to-40 degrees minimum.

6. Acceptable product:

   a. E.T.C. ColorSource Fresnel V

   b. Vari-Lite VL800 ProPAR

   c. Altman Lighting Hydra PAR AIP200

   d. Others contingent on pre-approval.

E. Provide full-color LED multi-cell asymmetric cyc lights. Fixtures shall include the following:

1. Corrosion resistant metal housing, mounting yoke, adjustable rubber feet for floor mounting. Provide with a black finish.

2. Full color LED light engine that utilizes one of the following LED arrays:

   a. RGBA: Red-Green-Blue-Amber

   b. RGBALC: Red-Green-Blue-Amber-Lime-Cyan

3. Built-in power supply with input voltage range of 100-240VAC, on-board processor, LED emitters with a minimum 50,000 hour L70 lamp life. Greater than 7,500 output lumens. Theatrical grade dimming with a 15-bit virtual dimming. Fixture shall be passively cooled without the use of fans.

4. Power in and thru via powerCON or powerCON TRUE1 connectors. Power leads shall use a 5' long powerCON (or TRUE1)-to-5-15P connector. DMX512 input and through connectors via 5-pin XLR connectors.

5. Fixture shall utilize an asymmetrical reflector for producing a smooth even wash from top-to-bottom of vertical backdrop.

6. Acceptable product:

   a. Altman Spectra Cyc 200 RGBA

   b. Vari-Lite CODA LED Cyc

   c. Others contingent on pre-approval by Theatre Consultant.

F. Provide warm-white LED wide flood work lights suitable for long throw worklight applications [stage overhead rehearsal lights or stage wing work lights]. Fixtures shall include the following:

1. Corrosion resistant metal housing, mounting yoke. Fixture body shall contain an accessory slot with locking capability for an accessory such as a gel frames, diffuser, or barndoor. Provide with a black finish.

2. Built-in power supply with input voltage range of 100-277VAC, on-board processor, LED emitter with a minimum 40,000 hour L70 lamp life. Greater than 10,000 output lumens. The fixtures shall have a CCT of 3,000 kelvin and a minimum CRI of 90. The fixture shall be passively cooled without the use of fans.

   a. LED light engine shall be dimmable via phase cut 2-wire dimming or via on-board local fader control.

3. Power in and thru via powerCON connectors. Power leads shall use a 5' long powerCON-to-L5-20P grounded twistlock connector.

4. Fixture shall include a diffused lens in frame.

5. Acceptable products:

   a. Altman Lighting Worklight II (#WL-90).

   b. Others contingent on pre-approval by Theatre Consultant.

G. Provide warm white LED fresnel/PAR-style wash light for long throw worklight applications [FOH Rehearsal lights]. Fixtures shall include the following:

1. Corrosion resistant metal housing or die cast aluminum, mounting yoke. Provide with a black finish.

2. Built-in power supply with input voltage of120VAC, on-board processor, LED emitter with a minimum 45,000 hour L70 lamp life. Greater than 10,000 output lumens. The fixtures shall have a CCT of 3,000 kelvin and a minimum CRI of 90. The fixture shall be cooled with low noise temperature-controlled cooling fans

   a. LED light engine shall be dimmable via phase cut 2-wire dimming or via DMX512 control. Fixture shall include DMX512 input and output data connections via XLR 5-pin connectors or via adaptor cables for precise control of dimming if desired.

   b. Fixture shall be capable of on/off control via line voltage relay switching without the need for a separate data connection. The fixture shall turn on and output light in less than 1 second from application of power.

3. Power in and thru via powerCON TRUE1 or powerCON connectors. Power leads shall use a 5’ long powerCON-to-L5-20P grounded twistlock connector. DMX512 input and through connectors via 5-pin XLR connectors

4. Fixture shall have an adjustable beamspread from 15 to 85 degrees via a zoom mechanism, from 10-to-30 degree via manual stops or shall vary beamspread via interchangeable lenses.

5. Acceptable products:

   a. Electronic Theatre Controls: Source 4WRD PAR, Gallery Edition, with MFL and WFL lenses

   b. Vari-Lite VL800 EventPAR WW

   c. Altman Pegasus8 LED Fresnel

   d. Other contingent on pre-approval by Theatre Consultant.

H. Provide full-color LED PAR-style wash lights with variable beam [stage wing run lights]. Fixtures shall include the following:

1. Die cast all metal housing, mounting yoke, accessory slots with locking capability for two accessories. Provide with a black finish.

2. Full color LED light engine that utilizes one of the following LED arrays:

   a. RGIL: Red-Green-Indigo-Lime

   b. RGBA: Red-Green-Blue-Amber

3. Built-in power supply with input voltage range 100-240VAC, on-board processor, (40) Luxeon LED emitters with a minimum 50,000 hour L70 lamp life.

4. Theatrical grade dimming with a 15-bit virtual dimming. Low noise cooling via a variable speed, temperature controlled or user controllable fan settings.

5. Power in and thru via powerCON or powerCON TRUE1 connectors. Power leads shall use a 5’ long powerCON-to-5-15P connector. DMX512 input and through connectors via 5-pin XLR connectors.

6. Beam shall be varied via interchangeable lenses or and adjustable a multi-stop lens assembly with beam angles of 10-30 degrees.

7. Acceptable product:

   a. E.T.C. ColorSource PAR (Deep Blue) with (1) narrow and (1) medium oblong lens per fixture.

   b. Vari-Lite VL800 EventPAR RGBA

8. permanently attached.

I. Provide 600 Watt LED 120V Followspots. Fixtures shall include the following:

1. Followspots to include integral power supply, 10' cable with Edison receptacle, and illuminated on/off rocker switch. Other features include:

   a. 7 deg to 14.5 deg zoom

   b. 6-way self-cancelling color boomerang

   c. A-size gobo holder

   d. Fully-closing iris cassette

   e. Chopper kit

   f. Stainless steel trim shutters

   g. Telescoping floor stand with casters and leveling jacks

2. Acceptable products:

   a. Robert Juliat OZ 1169TC

   b. Lycian Stage Lighting #1280

   c. Strong iChip 600 LT

   d. Others contingent on pre-approval.

J. Provide a ghostlight fixture consisting of a 72" tall base and stand assembly with a medium screw base socket enclosed with a protective basket. Base to include 3 locking casters. Fixture shall include 15' of 12/3 type SJ power cord with a 5-15P parallel blade+ground connector installed.

1. Supply with (1) E26 medium screw base LED lamp, A-21 size, approximately 20 watts, Phillips #451906 or equal.

2. Basis of design: Altman Ghost-Light.

K. STAGE LIGHTING FIXTURES EQUIPMENT LIST:

1. Stage lighting fixture quantities per schedules on project drawings.

2.06 STAGE LIGHTING ACCESSORIES

A. Provide stage lighting cable and accessories as indicated on the schedule of equipment quantities on project drawings. Cables shall be fabricated per the following criteria and per details on project drawings.

1. All extension cables shall be marked near each end for length identification per details on project drawings. Labels shall be covered with clear, shrink-wrap tubing. Utilize 3/4" wide Scotch 35 Color Coding Vinyl Electrical Tape for coloring. Length color code is as follows:

   a. 5' = Yellow

   b. 10' = Red

   c. 15' = (1) Yellow + (1) Red w/ 1/4" gap in-between

d. 20’ = (2) Red w/ 3/4” gap in-between

e. 25’ = Orange

f. 50’ = Brown

g. 75’ = (1) Brown + (1) Orange

2. All data extension and adaptor cables utilizing XLR 3,4,5 or 6-pin connectors shall utilize Neutrik XX-series connectors with gold plated contacts, black shell and colored bushings to identify cable function. Network extension cables shall utilize Neutrik Ethercon connectors. Bushing colors shall be as follows:

a. Network - XLR Ethercon = Blue

b. DMX512 - XLR 5-pin = Violet

c. DMX512 - XLR 3-pin = Gray

d. Power/Data - XLR 4-pin = Green

3. DMX data cables and power supply/data cables shall be terminated with heat shrink tubing over the drain wire and clear heat shrink tubing over the portion of cable where the outer jacket has been stripped from individual conductors.

4. Provide and install a tie-wrap with each extension cable for securing cables when coiled. Tie-line shall either be 1/8” black cotton trick line/tie-line, unglazed, attached to cables with clove hitch and half-hitch knots, minimum 36” long or as-noted on drawing details, a Velcro tie-wrap.

5. All extension, adaptor and miscellaneous cables shall be provided with a 3” long clear length of heat shrink tubing installed on cables for owner-provided labeling.

B. Extension cables

1. Provide CAT-5 Ethernet data portable extension cables with TMB ProPlex PCCAT5EP cable & Neutrik EtherCon RJ-45 connectors with black shells and colored bushing to identify cable function.

2. Provide portable DMX512 control extension cables constructed from TMB ProPlex PC224P cable with heavy-duty jacket and Neutrik 5-pin XLR connectors with gold plated contacts, black shells, and colored bushings to identify cable function.

3. Provide 12/3 type SO portable stage extension cables with male and female grounded 5-20 Edison connectors.

4. Provide 12/3 type SO portable stage extension cables with male and female grounded L5-20 connectors.

5. Provide 12/3 type SO portable stage extension cables with male and female 20A 120V grounded stage pin connectors.

6. Provide Neutrik powerCON or powerCON TRUE1 jumper cables for daisy-chain of LED light fixtures.

a. Final quantity of each style of extension cable will be determined during submittals depending on what connector type submitted fixtures use.

7. Provide PowerCon couplers for joining of PowerCon extension cables.

C. Adaptor & Miscellaneous Cables

1. Provide molded-rubber-cable twofers with 20 amp grounded Edison connectors. Lengths and quantities per schedules on project drawings.

2. Provide 12/3 male grounded stage pin to female grounded Edison adaptors.

3. Provide DMX terminating plug, XLR5M with 120 ohm resistor across pins 2 and 3.

D. Provide stage lighting tophats to fit LED profile spotlights. Sizes and quantities per schedules on project drawings. Tophats shall have a safety cable permanently-affixed.

E. Provide 4-pane stage lighting barndoors to fit PAR or fresnel spotlights and LED washlights. Barndoors shall have a safety cable permanently-affixed.

F. Tophats, barndoors, and color extenders shall have a safety cable permanently-affixed via a galvanized aircraft cable attached to the device with a loop terminated with a nicopress sleeve and with a snap hook captured at the other end via a loop and nicopress sleeve.

G. Provide template holder for profile and ellipsoidal reflector spotlights for A-size patterns.

H. Provide 3,000 spool of black unglazed tieline.

I. Provide road cases for storage of stage lighting accessories. Road cases shall have the following features:

1. Case construction shall conform to A.T.A. standards, specification 300, category 1.
2. Case shall be of the hinged-lid, rolling variety. Approximate outside dimensions of case shall be 40” long by 25” wide. The storage section shall be 24” high with an upper hinged lid section. With casters the overall height of the case shall be approximately 30”.
3. Cases shall be constructed from ½” plywood with a fiberglass laminate exterior surface bonded to plywood. Line the inside of the case with outdoor carpet or provide another method for limiting splintering along the inside walls of the case. Laminate surface color: BLACK.
4. All fittings and edges shall be fabricated with tapered aluminum and shall be attached via split steel rivets every 3”. Aluminum tongue-in-groove fittings shall be used at the perimeters of the lid to ensure positive alignment. A continuous length steel piano hinge shall be utilized for the lid along with 2 nylon straps to limit lid travel. (2) recessed spring loaded latches shall be provided opposite hinged side along with (4) recessed spring loaded handles with foam grips at the ends of the case. Steel ball corners shall be provided at each corner of the case. Provide (4) heavy duty ball-bearing casters with a minimum load bearing capacity of 225 pounds each. Attach casters to bottom of case with reinforcing caster plates.
5. Provide a removable wooden partition perpendicular to the long side of the case at the case center. Provide guides for the partition to slide into and a rounded rectangular hole near the top of the partition for a hand hold. Partition to be constructed from 1/2” wooden material that is resistant to splintering.
6. Stencil with white paint the top and 4 sides of the case with the name of the owner or auditorium (verify with Architect prior to fabrication), a unique case # (#1 though 3 or similar) and the text “STAGE LIGHTING” in 1” high block letters.
7. Case manufacturer shall be equal to Jan-al “Rhino ATA” or equivalent contingent on approval of the Theatre Consultant. Quantity per schedule on project drawings.

2.07 ACCEPTABLE STAGE LIGHTING EQUIPMENT MANUFACTURERS

A. Acceptable stage lighting dimming and relay rack manufacturers:

1. Electronic Theatre Controls (ETC)
   3031 Pleasant View Road
   Middleton, WI 53562
   800-688-4116
2. Strand Lighting
   10911 Petal Street

Dallas, TX 75238
214-647-7880

B. Acceptable stage lighting fixture manufacturers:

1. Electronic Theatre Controls (ETC)
2. Strand Lighting
3. Altman Stage Lighting

C. Acceptable dimmer circuit distribution equipment manufacturers:

1. Acceptable dimmer circuit distribution equipment manufacturers
2. Electronic Theatre Controls (ETC)
3. Strand Lighting
4. SSRC
5. Altman Stage Lighting

PART 3 - EXECUTION

3.01 INSTALLATION

A. Contractor shall furnish and install a completely functioning dimming system. All equipment, fittings, and peripheral devices for correct system operation shall be quoted and supplied.

B. Installation shall be in conformance with local, state and N.E.C. codes specifications and in accord with manufacturer's recommendations.

C. All lighting instruments and items of equipment, and individual components where applicable standards have been established, shall be listed by Underwriter's Laboratories, Inc. and shall be the U/L or ETL label when delivered and installed on job.

D. All ethernet cabling shall be category 5 UTP and shall conform to TIA-568B and shall be installed, terminated, and certified by a qualified technician. All installed ethernet segments shall be less than 250 feet (76 meters) in length to allow for the use of short lengths of portable ethernet cabling. All Ethernet network receptacles shall be labeled with a permanently engraved label attached to the receptacle faceplate indicating a unique port ID # as well as the maximum portable cable length allowed based on a maximum 100 meter run.

E. No part of the system shall be energized before being checked and the installation approved.

F. Protection and cleaning:

1. Materials and Equipment: Cover all equipment stored or installed on the site with polyethylene sheets or approved equivalent, to protect equipment from dust, moisture, plaster, cement, paint or work of other trades.
2. Storage: Provide proper and adequate storage facilities.
3. Damage: Replace all damaged or defective work, materials, or equipment. Install sensitive or delicate equipment after major construction work is completed.
4. Site Cleaning: Regularly remove waste and rubbish and maintain order.
5. Equipment Finish: Clean and polish all surfaces.

6. Acceptance: Remove all debris, dirt, grease, and oil from building surfaces caused by installation work. Clean and vacuum all rooms in which installation work has occurred.

G. Installation Notes:

1. Each dimmer circuit requires a separate hot and separate neutral. NO COMMON NEUTRALS.

2. The theatrical stage lighting drawings are diagrammatic only. Do not scale the drawings to determine the location of equipment.

3. Do all drilling, cutting, channeling and patching required to install lighting equipment and electrical work as indicated or herein specified. All holes, curbs, etc. in floors, ceilings, and walls shall be patched, unless indicated otherwise. Paint all new exposed electrical raceways, cabinets, enclosures, and fittings to match in color adjacent surfaces in finished areas.

4. Seal all penetrations through fire rated walls, ceilings, floors, etc., to maintain the fire rating. Furnish and install fire rated enclosures for all equipment penetrating into fire rated envelopes, spaces, etc.

5. Location of all conduit runs and junction boxes must be approved by the Theatre Systems Consultant and Electrical Engineer prior to actual construction.

3.02 SYSTEMS INTEGRATOR INSTALLATION RESPONSIBILITIES

A. Systems Integrator shall be responsible for the following:

1. Verify mounting locations for all wiring devices with installing contactor.

2. Verify all data cable types and wiring topologies with installing contractor based on system manufacturer requirements.

3. Coordinate early release of backboxes or other equipment required for rough-in.

4. Pre-configure and test all permanently installed intelligent architectural fixtures such as DMX-controlled fixtures that are connected to or controlled by the theatrical lighting systems.

5. Make a minimum of 5 site visits prior to initial system commissioning to monitor jobsite progress and to coordinate with the installing contractor.

6. Coordinate multi-cable and data cable installation supported by stage rigging with rigging contractor to ensure that cable is arranged per project drawings.

7. Terminate all stage lighting data wiring connected to the stage lighting dimming and control equipment even if the Systems Integrator was not part of the chain-of-supply for select pieces of equipment (DMX or 0-10V controlled lighting fixtures).

8. Test all Ethernet network segments and provide a detailed test report to the Theatre Consultant. A report with individual test reports for all Ethernet cable segments shall be submitted to the Theatre Consultant 5 days prior to commencement of the final punch list inspection. The report should be generated by a network analyzer similar to the Fluke DSP-4000 series

9. As an authorized field service commissioning agent for the primary theatrical lighting equipment vendor, commission the entire theatrical lighting dimming and control system.

a. Configure control data distribution system and architectural lighting control system with the following parameters.

1) The control network and dimming system shall be configured so that architectural lighting circuits (work lights, rehearsal lights, running lights) are not controlled by the stage lighting console.

2) The control network and dimming system shall be configured so that the stage preset pushbuttons can record all DMX addresses in universe #2 and all addresses in universe #1 except for the architectural lighting circuits.

3) The programming of the architectural lighting touchscreen stations and all button and fader stations shall be configured and tested with offline software 4 weeks prior to the expected system commissioning date in conjunction with the Theatre Consultant.

a) All pushbuttons at remote WCS and HCS stations shall utilize dim blue indicators when associated circuit(s) is off and bright green when on. All pushbuttons shall flash with a slow red indicator or use another scheme to indicate when a button is pressed that the station is locked out.

b) Instructions for recording Houselight & Stage presets as well as general operation of architectural lighting control system. Instructions shall be provided as user selectable help screens on the 7" LCD touchscreen. Circuit #'s for architectural lighting circuits shall be listed along with help screens.

10. Verify that all manufactured items delivered to the project site are fabricated per approved submittal drawings prior to installation.

11. Coordinate receiving of portable theatrical equipment and prevent from loss or damage until time of installation or turnover.

12. Provide trained and highly qualified theatrical stage lighting technicians to properly hang and focus aim adjust the stage lighting spotlight fixtures. This installation shall consist of the following:

a. Unpack light fixture, install c-clamp, safety cable, and any related hardware or accessories, dispose of packing materials.

b. Hang fixtures and connect to power circuit receptacles as noted on initial light plot. Install portable data cable for intelligent fixtures.

c. For intelligent, programmable fixtures perform a complete setup including assigning DMX addresses and applying other profile settings as requested by Theatre System Consultant and as required to provide an integrated functioning system.

d. Do not install fixtures until facility is reasonably dust free to prevent the accumulation of dust and dirt on lenses and reflectors. If facility is not dust free place plastic bags over fixtures and until time of checkout. Unplug fixtures to prevent accidental activation while fixtures are covered.

e. Patch all lighting fixtures at control console and verify that entire light plot functions normally when controlled by primary control console and architectural control system. Verify that current fixture profiles are installed for all intelligent fixtures provided as part of the project. Obtain missing profiles from the control console manufacturer or create full function profiles with a personality editor.

13. Provide training sessions to end-user as defined elsewhere in specification.

14. Deliver project closeout documents including O&M manuals for all theatrical lighting equipment as well as as-built submittal drawings. See additional requirements in project general conditions documents.

3.03 TESTING AND COMPLETION

A. Provide all instruments for testing and demonstrate in presence of the School's Representatives that all circuits and wiring tests free of shorts and grounds.

B. Furnish all labor, instruments, appliances, equipment, and materials necessary to demonstrate to the School that the installations perform as required and are as specified herein.

C. The School reserves the right to make independent tests of all equipment furnished to determine whether or not equipment complies with requirements specified herein and to accept or reject any or all equipment on basis of results thereby obtained.

D. Within 14 days of written request, stage lighting systems manufacturer shall provide a factory engineer to check installed systems and make any adjustments or modifications necessary for proper operation.

E. Should any follow-up checkout and inspection visits be required by the Architect, Electrical Engineer or Theatre Systems Consultant due to any installation caused matters after the approved completion of the project, the Contractor shall bear this cost at the Architect's, Engineer's and Consultant's standard hourly rates. This shall be scheduled and approved in writing.

3.04 TRAINING AND INSTRUCTION

A. The stage lighting equipment manufacturer and/or the Contractor shall provide operations and maintenance instruction to School personnel as follows:

1. A minimum of two (2) and not to exceed four (4) hours of operations instruction for the School's faculty, staff, and students.

2. A minimum of one (1) and not to exceed two (2) hours of maintenance instruction for the School District's maintenance staff

B. All training sessions shall be coordinated with the school schedule. Cost of such instructional services shall be part of the Contractor's bid.

C. Review of written operations and maintenance manuals and submittal drawings shall take place during these training sessions.

END OF SECTION

SECTION 26 56 19

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
2. Luminaire supports.

B. Related Requirements:

1. Section 260926 "Lighting Control Panelboards" for panelboard-based lighting control.

1.2 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of the following:

1. Luminaire.

B. warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1. Provide a list of all lamp & LED drivers types used on Project. Use ANSI and manufacturers' codes.
2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

1.6 FIELD CONDITIONS

A. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.7 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Warranty Period: **5** year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**.

B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.

1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified.

2.2 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. UL Compliance: Comply with UL 1598 **and listed for wet location**.

E. Lamp base complying with **ANSI C81.61 or IEC 60061-1**.

F. CRI of **minimum 80**. CCT of **4100 K**.

G. L70 lamp life of **50,000** hours or manufacturer’s standard lamp life as specified.

H. Nominal Operating Voltage: **120/277 V ac**.

I. Lamp Rating: Lamp marked for **outdoor use**.

J. Source Limitations: Obtain luminaires from single source from a single manufacturer.

K. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

L. Fixtures must have integral drivers (no remote ballasts/drivers).

2.3 LUMINAIRE TYPES (REFER TO LIGHTING FIXTURE SCHEDULE) ALL FIXTURES SPECIFIED ARE DISTIRCT STANDARDS AND NO SUBSTITUTIONS ARE ALLOWED.

2.4 FINISHES

A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.

a. Color: refer to lighting fixture schedule, confirm finishes with Architect/District prior to ordering, colors shall be selected from manufacture’s standard finishes..

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Install lamps in each luminaire.

D. Fasten luminaire to structural support.

E. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

F. Wall-Mounted Luminaire Support:

1. **Attached to structural members in walls**.

G. Wiring Method: Install cables in raceways. Conceal raceways and cables.

H. **Install luminaires level, plumb, and square with finished grade unless otherwise indicated.**

I. Coordinate layout and installation of luminaires with other construction.

J. Adjust luminaires that require field adjustment or aiming.

K. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.2 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

B. Perform the tests and inspections

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Verify operation of specified lighting controls.

C. Illumination Tests:

1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):

   a. IES LM-5.
   b. IES LM-50.
   c. IES LM-52.
   d. IES LM-64.
   e. IES LM-72.

2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

D. Luminaire will be considered defective if it does not pass tests and inspections.

E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.5 DEMONSTRATION

A. Train District's maintenance personnel to adjust, operate, and maintain luminaires.

END OF SECTION

SECTION 26 96 00. D

TESTING REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Test procedures specified in this Section are in addition to that specified in other Sections of Division 26.

B. Provide the services of a recognized independent testing firm to perform testing work, including but not limited to:

1. Switchboards and distribution panels.
2. Grounding system.
3. Circuit breakers 100 amperes and larger.
4. Transformers.

1.02 REFERENCES

A. Perform inspections and tests in accordance with the following codes and standards:

1. National Electrical Manufacturer's Association - NEMA.
2. American Society for Testing and Materials- ASTM.
3. Institute of Electrical and Electronic Engineers- IEEE.
4. International Electrical Testing Association- NETA Acceptance Testing Specifications- ATS-1991
5. American National Standards Institute -ANSI.
6. State and local codes and ordinances.
7. Insulated Cable Engineers Association - ICEA.
8. Occupational Safety and Health Administration - OSHA.
9. ANSI/NFPA 70: National Electrical Code.
10. ANSI/NFPA 70B: Electrical Equipment Maintenance.
11. NFPA 70E: Electrical Safety Requirements for Employee Workplaces.
12. ANSI/NFPA 78: Lightning Protection Code.
13. ANSI/NFPA 101: Life Safety Code.
14. NFPA 72

B. Division 26 specification sections and drawings are interrelated. Use Division 26, in its entirety, and accompanying electrical drawings for interpreting inspection and testing requirements.

C. Use Manufacturer's instruction manuals applicable to each particular equipment/device for special inspection and testing requirements.

1.03 SUBMITTALS

A. Comply with provisions of Division 01 -: SUBMITTAL PROCEDURES.

B. Provide the following certified test report information, including but not limited to:

1. Summary of job.
2. Description of equipment tested.
3. Description of test procedure.
4. List of test equipment and calibration date.
5. Test results.
6. Conclusions and recommendations.
7. Appendix, including all field test reports.

C. Provide report certification by a licensed contractor technician.

D. Secure report and test documents together using index tabs and a 3-ring binder.

E. Provide brief field report after completion of any test prior to leaving the site. Report may be typed or printed. List the equipment tested, describe any deficiencies found and recommended corrections. Leave report copies with the Inspector of Record (I.O.R) and General Contractor.

1.04 TESTING AGENCY QUALIFICATIONS

A. Member of the International Electrical Testing Association, specializing in the testing of equipment or apparatus specified in this Section with minimum 5 years' experience and employed by contractor.

1.05 DIVISION OF RESPONSIBILITY

A. Routine work performed by the Contractor prior to and in addition to tests performed by the testing firm:

1. Cleaning of equipment and apparatus.
2. Insulation-resistance and continuity test.
3. Rotation test.
4. Equipment bolt torquing.
5. Inspect for physical damage.
6. Proper equipment connection and operation.
7. Coordinate exact motor overload requirements.

B. The Contractor has the option to assign all or any portion of above listed routine work to the testing firm at his own expense. All testing equipment, cabling and grounding system must be performed by a certified technician.

C. The Contractor provides suitable and stable source of electrical power to each test site as required for the testing.

D. The Contractor notifies the Inspector of Record (I.O.R) and the testing technician when equipment becomes available for acceptance tests. Work coordinated to expedite project scheduling.

E. The Contractor is responsible for providing a Over Current Protective Device and Arc Flash Study (along with equipment submittals) prepared and certified by an independent testing or engineering firm or manufacturer of the equipment as outlined by Sections 26 0573.19.

F. The testing firm notifies the District's representative prior to commencement of any testing.

G. Report any system, material, or workmanship which is found defective on the basis of acceptance tests to the Owner's representative in writing.

H. The testing technician maintains a written record of all tests and, upon completion of project, assembles and certifies final test report.

I. Safety and Precautions:

1. Safety practices include, but are not limited to, the following requirements:

a. Occupation Safety and Health Act.
b. Accident Prevention Manual for Industrial Operations, National Safety Council.
c. Applicable state and local safety operating procedures.
d. Owner's safety practices.
e. National Fire Protection Association- NFPA 70E.
f. American National Standards for Personnel Protection.

2. Testing performed with apparatus de-energized. Exceptions must be thoroughly reviewed to identify safety hazards and devise adequate safeguards.

3. The testing technician provides a designated safety representative on the project to supervise the testing operations with respect to safety.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

A. The testing technician provides all test equipment.

B. Care and Precautions:

1. Contractor responsible for any damage to equipment or material due to improper test procedures or test apparatus handling. Replace or restore to original condition any damaged equipment or material.

2. Provide and use safety devices such as rubber gloves and blankets, protective screen,

barriers and danger signs to adequately protect and warn all personnel in the vicinity of the tests. Use test equipment that is calibrated and certified traceable to the National Bureau of Standards. Certification date: No later than 6 months.

PART 3 - EXECUTION

3.01 APPLICATION

A. General:

1. Provide all materials, supplies, tools, equipment, labor, and services required to perform all tests as specified in this Section.

2. Correct all deficiencies revealed by tests. Replace at contractor's cost, all materials and equipment found faulty.

3. The testing intent is to assure that all electrical equipment, both contractor and Owner supplied, is operational within industry and manufacturer's tolerances and is installed in accordance with design specifications.

4. The test and inspections determine the suitability for energization.

5. Use the Inter National Electrical Testing Association (NETA) guidelines for all testing procedure and acceptance test values of results.

6. Complete all test prior to commissioning and final acceptance.

B. Summary:

1. Test all cable, equipment and systems listed above to assure proper installation, setting, connections, and functioning in accordance with the Drawings, Specifications, and the manufacturer's recommendations. It is the intent that field testing be extensive, and

complete as specified, to provide positive assurance of totally correct installation and operation of equipment.

2. Furnish all necessary test equipment to satisfactorily perform all tests specified herein.

3. When conducting tests, comply with the following:

   a. Notify the Owner and I.O.R at least 2 weeks prior to commencement of any testing.
   b. Conduct all tests in the presence of the Owner's Representative and I.O.R except when advised that his presence will not be necessary.
   c. Include all tests and inspections recommended by the equipment manufacturer whether required by these Specifications or not, unless specifically waived by the owner.
   d. Maintain a written record of all tests showing date, personnel making test, equipment or material tested, tests performed, manufacturer and serial number of testing equipment and results.

4. Tests include, but are not limited to, the following:

   a. All Wiring: Free of shorts unintentional and grounds.
   b. Power Circuit Breakers: Calibration to time/current curves, physical condition, contact resistance, insulation resistance.
   c. Grounding system: Ground resistance (impedance), ground integrity.
   d. Secondary Service Bus Ducts: Proper torque on connections, insulation resistance, physical condition.
   e. Motor Controls: Proper overload heater sizes.
   f. Ground Fault System: Neutral free of improper grounds and pick-up.
   g. Protective Relays: Pick-up, timing, insulation resistance, physical condition.
   h. Switchboards, Panelboards, and similar circuit breaker equipment: Insulation resistance, physical condition.
   i. Feeder Cables: Insulation resistance.
   j. Motors: proper rotation, insulation resistance.
   k. Trip setting, adjustments and testing of all electronic breakers as selective coordination test reports based on the coordination study described in Section 26 05 73

C. Minimum Acceptable Test Results:

1. Ground System: The main ground electrode system resistance to ground no greater than 5 ohms and as permitted in C.E.C. Article 250.

2. Electrical Apparatus and System Insulation Resistance:

   a. Rating of Equipment of 250 volts maximum: Use 500 volt D.C. test voltage.
   Minimum insulation resistance, 25 megohms.
   b. Rating of equipment of 600 volts: Use 1000 volt D.C. test voltage.
   Minimum insulation resistance, 100 megohms.

3. Wire and Cables Under 600 Volts:

   a. Rating of cables of 300 volts maximum Use 500 volt D.C. test voltage.
   Minimum insulation resistance, 50 meg-ohms.
   b. Rating of cables of 600 volts maximum: Use 1000 volt D.C. test voltage.
   Minimum insulation resistance, 50 meg-ohms.

4. Wire and Cable Over 600 Volts – refer to section 26 05 13.

3.02 TECHNICAL REQUIREMENTS

A. Grounding Systems:

1. Tests include measurement of ground resistance at the following equipment and

structures:

a. All primary main switchboard including new main breaker and distribution section of the switchgear.
b. All power Isolation transformers.
c. All secondary distribution boards (I Line Panel Boards) & Branch circuit panels located within buildings.
d. Other miscellaneous grounds selected at random in a manner to be representative of the entire installation.
e. Ground system ground rods, including those in manholes.
f. Isolated instrumentation system.

2. Use "3 probe- fall of potential" method ground tests made on system ground rods. All other ground tests may be measured to system ground by use of ground reference method.

3. Verify that ground system installation is completed before performing testing work.

4. Ground circuits showing more than 5 ohms resistance will be considered defective and repaired by the Contractor at his own expense. Provide additional sectionalizing ground rods to achieve required test results. The rods shall be installed 6'-0" apart.

B. Switchboard Breakers:

1. Electrical Tests:

a. Megger test breaker. Voltage 1000 + 2x rated voltage phase to phase, phase to ground with breaker closed, cross pole breaker open.
b. Check trip free operation.
c. Test trip devices using the primary injection current method. Verify trip timing to manufacturer's specification values. Test values that fail to meet the NETA or manufacturer guidelines: Include equipment, device, test values and failure reason on the daily report submitted to the I.O.R and General Contractor.

C. Ground Fault System:

1. Complete testing work before the initial energization of the service equipment.

D. . Metal Enclosed Switchgear and Switchboard Assemblies:

1. Visual and Mechanical Inspection:

a. Inspect for physical damage and code violations.
b. Inspect for proper alignment, anchorage, and grounding.
c. Inspect for proper identification of protective devices and switches.
d. New Bus bar extension & alignment of new section addition to existing main switchboard.

2. Electrical Tests:

a. Measure insulation resistance of each bus section phase to phase and phase to ground.

E. Transformers- Dry-Type (Isolation Type)

1. Visual and Mechanical Inspection:

a. Inspect for physical damage, proper installation, anchorage and grounding.
b. Verify proper auxiliary device operation such as fans, temperature indicators, etc.

2. Electrical Tests:

a. Perform insulation resistance tests winding-to-winding and winding-to-ground.
b. Perform turns ratio test between windings for all tap positions.

F. Thermo graphic Survey:

1. Visual and Mechanical Inspection:

a. Remove all necessary covers prior to scanning.
b. Inspect for physical, electrical, and mechanical condition.

2. Equipment to be scanned as follows:

a. Transformers-Dry-Type
b. Main Distribution Switchboard.

G. Contractor’s authorized qualified NETA certified service technician shall provide the testing and operation, adjustments, programming as required.

3.03 RETESTING

A. Retest any equipment which does not pass initial tests, or where subsequent testing is required for acceptance as directed by the Owner's Representative.

3.04 REPLACEMENT OF DEFECTIVE MATERIAL OR EQUIPMENT

A. Repair or replace any material or equipment found defective or cannot pass the tests specified in this Section at no additional cost to the Owner.

B. Complete correction of defective material or equipment and retesting within the Contract period.

C. If the equipment or material cannot pass the second test, remove the defective equipment, and replace it with equivalent equipment that meets the requirements of the Specifications. Such replacement at no additional cost to the Owner.

D. Remove defective equipment or material from the site no later than 15 days from the date of notification by the Owner or his representative.

END OF SECTION

Division 26 Appendix A

Schneider Quote 3550985

SQD Record Drawing 052001

This portion covers Main Circuit Breaker Replacement of Obsolete existing Main Breaker with new.

Furnished, Installed & Tested By SQ-D. per Bill of Materials.

Prepared By:
Kevin Kebler
Services Sales Executive
kevin.kebler@se.com

Proposal Name: LV Modernization - MDC Engineers - Hacienda La Puente- Performing Arts Center - La Puente, CA

Quote Name: SR#2022-101455 2500A NW Retrofill

Proposal Number: P-220718-3168151

Quote Number: Q-3550985

Quote Effective Date: 08/26/2022

Through Addenda Number: 0

Sales Representative: Kevin Kebler (PH: 714-831-7068)

Conditions of Sale

Except as otherwise provided below, this Quotation is subject to Coordinated Project Terms. See https://www.schneider-electric.us/en/download/document/0100PL0043

Notwithstanding any provision to the contrary in the referenced Coordinated Project Terms or any other documentation provided in connection with this proposal, this quote is valid for 30 days. Quoted lead times are approximate and subject to change.

Schneider Electric reserves the right to amend, withdraw or otherwise alter this submission without penalty or charge as a result of any event beyond its control arising from or due to the current Covid-19 epidemic or events subsequent to this epidemic / pandemic including changes in laws, regulations, by laws or direction from a competent authority.

Total Contractor Net	**$62,269.00**

Commitment to Safety

Schneider Electric is dedicated to providing industry leading products, solutions and services for today and the world of the future. We are committed to globally implementing superior safety practices, education and awareness. Our employees understand their responsibilities and are encouraged to embrace safety as a lifestyle. This global model not only applies to our internal business and manufacturing facilities, but is equally integrated into our products and the services provided to our customers.

Schneider Electric has received many acknowledgements for its work place safety practices including:

- **The Robert W. Campbell Award** - Presented by the National Safety Council (NSC) for world class operational safety practices. This honor has only been achieved by ten other organizations worldwide. (2009)
- **The Occupational Excellence Achievement Award** (2009) - Presented by the National Safety Council (NSC)
- **Green Cross for Safety Medal** (2011) - Presented by the National Safety Council (NSC)
- **The Safety Award for Excellence** (2012) - Presented by The Electrical Safety Foundation International

Through research, revolutionary engineering and innovative design, we strive to protect not only our employees, but our customers and the end users of our products and services.

*DISCLAIMER: The Customer acknowledges that the products or part thereof are produced in, or otherwise sourced from, or will be installed areas already affected by, or that may be affected in the future by, the prevailing COVID-19 epidemics/pandemic and that the situation may trigger stoppage, hindrance or delays in Vendor's (or its subcontractors) capacity to produce, deliver, install or service the products, irrespective of whether such stoppage, hindrance or delays are due to measures imposed by authorities or deliberately implemented by the Vendor (or its subcontractors) as preventive or curative measures to avoid harmful contamination exposure of Vendor's (or its subcontractors') employees. The Customer therefore recognizes that such circumstances shall be considered as a cause for **excusable delay** not exposing the Vendor to contractual sanctions including without limitation delay penalties, liquidated or other damages or termination for default.*

Schneider Electric reserves the right to amend, withdraw or otherwise alter this submission without penalty or charge as a result of any event beyond its control arising from or due to the current Covid-19 epidemic or events subsequent to this epidemic / pandemic including changes in laws, regulations, by laws or direction from a competent authority.

Introduction

Per our understanding of your request and associated correspondence, Schneider Electric USA, Inc. (SEUSA) Services has based our offer on the information contained within this proposal. If this information is not accurate or there are changes to the proposed scheduling, then additional charges may apply.

Scope of Work

SEUSA Services will perform the Scope of Work identified in this proposal per the following price:

Item #	Scope of Work
1	**Designation :** 2500A NW Retrofill **Product Details :** 1-SRVLVMMPT-Low Voltage Retrofill & Custom Solutions ---------- SCOPE OF WORK 1. Schneider Electric USA, Inc. - (SEUSA) Services will remove (1) existing 2500 AF circuit breaker and retrofill it with (1) Masterpact NW circuit breaker. As no short-circuit current rating is available at this time, the breaker as quoted is rated 100 KA at 240 VAC. Should the subsequent study show that a breaker of a higher rating is required, additional costs will apply. 2. SEUSA Services will supply and install all necessary components to connect the breaker to the existing system, including: new copper bus, front door, bus supports, and breaker mounting plate. 3. A site visit will be required by a Schneider Electric Services Technician, assisted by an engineer remotely, to obtain the necessary measurements required for the design. A bus outage of 8 to 10 hours will be required for this visit. Schneider Electric Services will require a 6-8 week notice to schedule this visit. 4. The customer will be responsible for supplying the following: -Submittals, Plan Check, and City Permits if required -Cost and scheduling of power shut downs -All existing electrical drawings of their system -Paint Sample if other than ANSI 61 Detailed BOM ---------- 1 - Masterpact NW Breaker (Fixed) Voltage: 240 VAC Continuous Current: 2500A Interrupting Rating: 100 KA UL 489 Manually Operated Micrologic Trip Unit 5.0P Long Time Short Time Instantaneous Power Meter Modbus Communications UL Type A Rating Plug Auxiliary Contacts: 4 Remote Reset: None Push Button Interlock

	Spring Charge Interlock 1 - Retrofill Kit, Includes: copper bus, new door, barriers, etc. 1 - A/P Trip Unit Kit, Includes: 24Vdc power supply, CPT, fuses, fuse blocks, etc. ----------

Item #	Scope of Work
2	**Designation :** ERMS Switch **Product Details :** 1-SRVLVMMPT-Low Voltage Retrofill & Custom Solutions ---------- SCOPE OF WORK WORKSCOPE: ERMS SWITCH 1. Schneider Services (SEUSA) proposes to supply and install (1) Energy Reduction Maintenance Setting (ERMS) switch for the 2500A breaker, per NEC 240.87. When the ERMS is switched to Maintenance Mode in conjunction with proper study, the circuit breaker provides reduced arc flash incident energy (AFIE) by temporarily lowering the instantaneous pickup setting of the circuit breaker trip unit. See note below. Note: If left in Maintenance Mode, selective coordination is compromised, which could lead to nuisance tripping. Proper use of an ERMS system requires an arc flash study to determine the optimal settings for the breaker trip unit in Normal and Maintenance Mode and to determine the AFIE in both modes. 2. SEUSA Services will supply wiring drawings and schematics for the ERMS Switch system. ---------- DETAILED BOM 1 - Selector Switch w/ Pad Lock attachment & Contact Block 1 - Blue Pilot Light 1 - I/O Module 1 - IFE Module 1 - 24V Power Supply 1 - ULP Cord 1 - Circuit Breaker ULP Cord 2 - ULP Terminator (bag of 10) 1 - ERMS Installation Guide & Labels ---------- CLARIFICATIONS 1. Custom engineered solutions from Schneider Electric Services are designed and built to meet applicable UL/ANSI/IEEE standards, but will not carry third party labeling. We have included a UL field evaluation for UL labeling in this quotation.

	2. The Scope Of Work and Bill Of Material provided in this quotation are strictly and specifically, as stated. Any changes or additions may require the quotation to be revised, which may result in a price change. 3. Schneider Electric-Services has prepared this quotation in good faith, according to our understanding of the information and/or specification(s) provided. Schneider Electric reserves the right to offer revised pricing, Bills of Material or Scope of Work in the event of an omission or mis-interpretation of the specification. 4. Customer and/or Contractor is responsible for all handling and rigging necessary for gear placement. 5. All lead-times referenced within this proposal are estimates only, unless specifically noted as a committed ship date. Due to the extreme volatility and shortages in the commodities markets, lead-times may increase. We will do what we can, within our control, to hold lead-times. In the event that a lead-time may increase, we will notify you as soon as we are aware, to lessen the impact to the project. --- SCHEDULE 1. 28-30 Weeks After Engineering Remote Site Visit 2. FOB West Chester, OH Plant 3. Freight Pre-Paid and Added to Invoice ---

Item #	Scope of Work
3	**Designation :** Remote Site Visit **Product Details :** 1-SRVODSOTHLVMLABOR-Low Voltage Retrofill & Custom Solutions Labor --- Labor Type This job is being quoted for work to be performed during normal working hours (M-F 8:00 AM - 5:00 PM excluding Schneider Electric holidays) unless otherwise noted. ---

Item #	Scope of Work
4	**Designation :** Inventory Parts **Product Details :** 1-SRVODSOTHLVMLABOR-Low Voltage Retrofill & Custom Solutions Labor --- Labor Type This job is being quoted for work to be performed during normal working hours (M-F 8:00 AM - 5:00 PM excluding Schneider Electric holidays) unless otherwise noted. ---

Item #	Scope of Work
5	**Designation :** Install **Product Details :** 1-SRVODSOTHLVMLABOR-Low Voltage Retrofill & Custom Solutions Labor ---

	Labor Type This job is being quoted for work to be performed during normal working hours (M-F 8:00 AM - 5:00 PM excluding Schneider Electric holidays) unless otherwise noted. ----------

Item #	Scope of Work
6	**Designation :** Study **Product Details :** 1-SRVINAARC-System Studies - IBS ---------- SCOPE OF WORK This proposal is based on Schneider Electric providing the following services based on our discussions: • On-Site Data Collection • Single-line Diagram • Short Circuit Analysis • Overcurrent Protective Device Coordination Analysis • Arc Flash Study ---------- CLARIFICATIONS 1. Study is limited to the (1) new circuit breaker being supplied under this order. ----------

Item #	Scope of Work
7	**Designation :** UL **Product Details :** 1-SRVODSMVCOR-Reactive Maintenance on MV Assembled Products ---------- SCOPE OF WORK Schneider Electric Services will arrange a UL Field Evaluation of retrofill circuit breaker. ----------

- Unless otherwise noted, an outage will be required to perform the work. Duration of this outage to be determined at time of scheduling.
- If any additional electrical or mechanical defects are found during our investigation, these will be brought to your immediate attention. Authorization for these repairs and their costs will be agreed upon before any additional work is performed.

Customer Responsibilities

- Schedule power outage with the local utility or production and absorb all related costs.
- Provide lighting and 120V power with GFI for Field Services' on-site electrical equipment, if required.
- Provide qualified personnel to de-energize / re-energize equipment as defined by NFPA70E.
- Provide qualified personnel to lock out equipment and verify zero energy state as defined by NFPA70E.
- Provide qualified individual for grounding of equipment as required.
- Provide proper workspace clear of obstruction with adequate temporary lighting for the walk ways and emergency exits. *Work will not commence until adequate lighting is in place. *
- Provide a phone with defined emergency contact and site location in event of an emergency.
- Provide an authorized person to sign all manifests for asbestos and PCB wastes (if any)
- Labor and expense cost overruns due to:
  - Delays by others
  - Lack of equipment readiness for services outline herein

Work Not Included

- Any site-specific meetings or customer specific safety or clearance training greater than one hour conducted during the date of service or required outside the dates of service.
- Development of switching procedures and/or MOP’s.
- Update of original factory order drawings.
- Additional site visits or meetings beyond that required to perform the scope of work above

Schedule

Services should be scheduled at least 10 working days in advance (20 days for holidays), and cancelled at least two working days in advance of scheduled start of service.

Price

Price includes all travel, mileage, expenses, and any applicable Field Service Reports that will document and detail the services performed.

This proposal is subject to the following:

- Price quoted does not include any state, federal, or local taxes.
- Service will be scheduled after receipt of order.
- If tax exempt, exempt certificate must accompany purchase order.
- Payment is due upon receipt of invoice.

Shipment Clarification

All lead-times referenced within this proposal are estimates only, unless specifically noted as a committed ship date. Due to the extreme volatility and shortages in the commodities markets, lead-times may increase. We will do what we can, within our control, to hold lead-times. In the event that a lead-time may increase, we will notify you as soon as we are aware, to lessen the impact to the project.

Payment Schedule

All projects will be billed based on execution milestones, schedule of values to be provided after receipt of PO. SEUSA may invoice purchaser monthly for all work performed, and for all equipment delivered to the job site or to an off-site storage facility. Purchaser may delay the work, for a period not to exceed 60 days, by giving notice to SEUSA, and purchaser shall pay for all work prior to the delay and will pay all costs incurred by SEUSA because of such delay.

Proposal Acceptance

Due to the extreme volatility in the commodities markets, this quotation is valid for only 30 days. Currently there is extreme volatility in the steel markets (especially electrical steel) due to the evolving nature of the tariffs. We will do our best to hold the pricing but there are many factors beyond our control and these potential increases would be passed along to the customer. It is also assumed that this project will be executed within 12 months. If the execution timeline of this project exceeds this timeframe, any price escalations would also be passed along to the customer. In addition, any changes to the Scope of Work or Bill of Material will require a revised quotation which may result in a price change.

To accept this proposal, issue a P.O. to a local Square D by Schneider Electric distributor. Click the link below or copy the URL and paste it into your browser to locate a SEUSA Services support center nearest you.

Link: https://www.schneider-electric.us/en/work/support/locator/

Distributor Proposal Acceptance

Please send completed Purchase Orders along with this quotation to:

Schneider Electric USA, Inc.
200 N. Martingale Rd, STE 1000
Schaumburg, IL 60173
Email to: kevin.kebler@se.com

The following information is required:

- Site contact name
- Phone number
- Email address

Please also include SEUSA account number (if known).

Terms and Conditions

The work described in This quotation shall be governed by Schneider Electric's Standard Terms and Conditions of Sale, which may be found at: www.schneider-electric.us/termsandconditions

This proposal has been distributed to you on a confidential basis for your information only. By accepting it, you agree not to disseminate it to any other person or entity in any manner and not to use the information for any purpose other than considering opportunities for a cooperative business relationship with Schneider Electric.

Information on Additional Offers

Electrical Distribution Services - Website

- Modernization & Upgrade:
  - Website: Schneider Electric Modernization Solutions
  - Blog: True Cost of Switchgear Replacement
  - White Paper: Guidelines for Modernizing Existing Switchgear
  - Videos: Resource webpage
  - Brochure: Switchgear Modernization Brochure
  - Catalog: Circuit Breaker Modernization Selection Guide
- Arc Flash Safety:
  - Website: Solutions for OSHA and NFPA 70E Compliance
  - Blog: NFPA 70E 2018 Updates
  - White Paper: Mitigating Arc Flash Hazards
  - Video: Power System Assessment
  - Brochure: Engineering Services

SQUARE D COMPANY

Job Name:	TEMPLE ELEMENTARY SCHOOL	Square D Quotation #:	15088342
Job Location:	HACIENDA-LA PUENTE CA	Quotation Revision #:	
		Sales Contact:	GA/FO/MH
		Sales Contact Location:	650
Purchaser:	NORTON ELEC WHSLE MART	Customer:	HACIENDA LA PUENTE UNIFIED SC
Purchaser PO #:	340812	Customer PO #:	
User:	HACIENDA LA PUENTE UNIFIED SCHOOL	Architect:	HACIENDA LA PUENTE UNIFIED SC
User Location:		Cons. Engineer:	HACIENDA LA PUENTE UNIFIED SC
Drawing Status:	RECORD		

TABLE OF CONTENTS

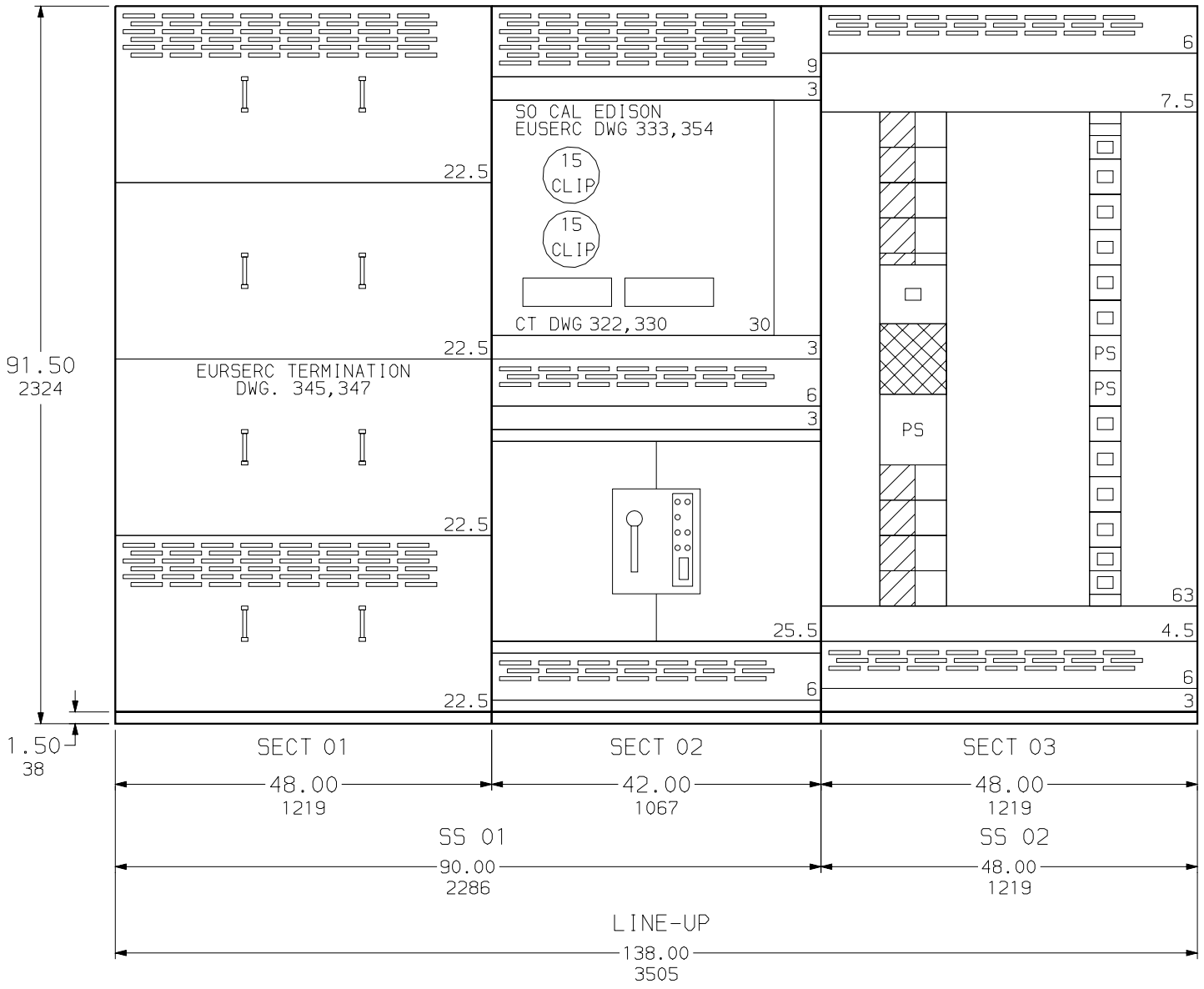
SQUARE D FACTORY ORDER NUMBER: 15088342-001

REV	DESCRIPTION	BY	DATE

BOTTOM FEED
TOP BUS
19.5 DEEP

TOP FEED
TOP & BOTTOM BUS
19.5 DEEP

BOTTOM FEED
BOTTOM BUS
19.5 DEEP

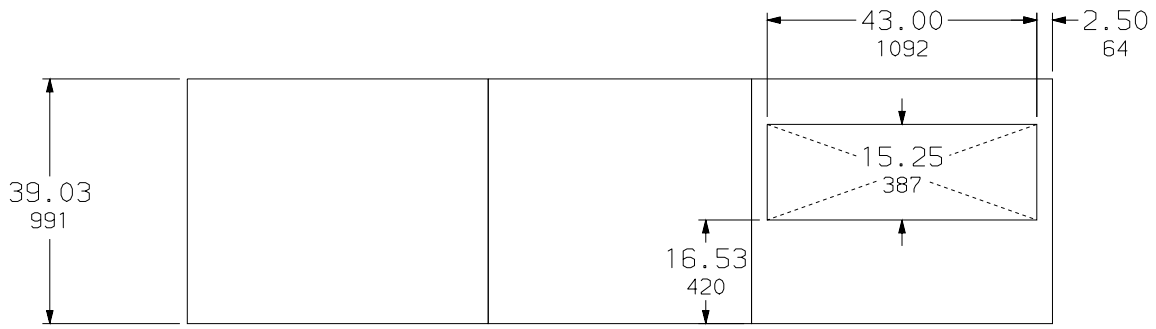


FRONT ELEVATION

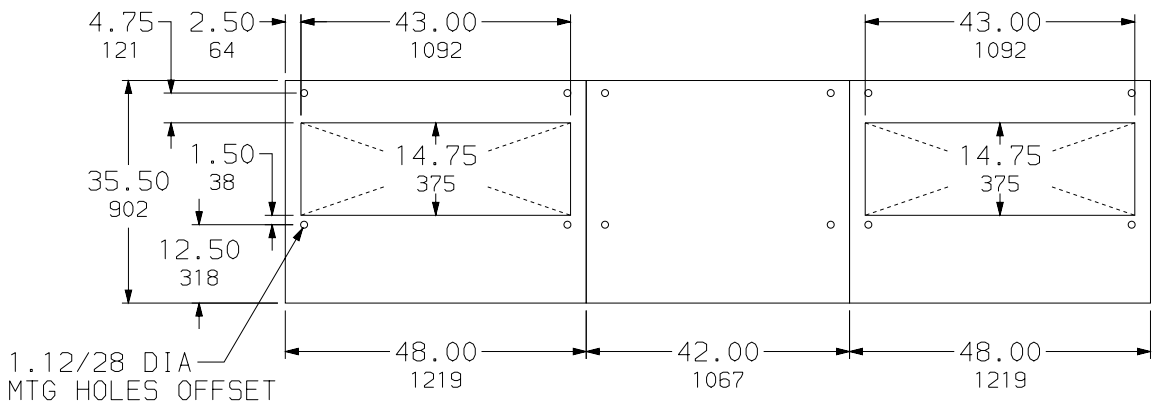
DUAL DIMENSIONS: INCHES
MILLIMETERS

JOB NAME:	TEMPLE ELEMENTARY SCHOOL	EQUIPMENT DESIGNATION:	**Main Switchboard 'MS'**
JOB LOCATION:	HACIENDA-LA PUENTE CA	EQUIPMENT TYPE:	POWER STYLE QED SWBD
DRAWN BY:	CAD	DRAWING TYPE:	ELEVATION
ENGR:	----		SQUARE D COMPANY
DATE:	MAY 30, 2001		
DRAWING STATUS:	RECORD	DWG# F15088342-001-01	PG 1 OF 4 REV -

REV	DESCRIPTION	BY	DATE



TOP VIEW



FLOOR PLAN

NOTE:
A MINIMUM OF 2.00/51 CLEARANCE BEHIND THE SWITCHBOARD IS REQUIRED FOR TOP COVER OVERHANG.

DUAL DIMENSIONS: INCHES
MILLIMETERS

JOB NAME:	TEMPLE ELEMENTARY SCHOOL	EQUIPMENT DESIGNATION:	Main Switchboard 'MS'
JOB LOCATION:	HACIENDA-LA PUENTE CA	EQUIPMENT TYPE:	POWER STYLE QED SWBD
DRAWN BY:	CAD	DRAWING TYPE:	TOP VIEW/FLOOR PLAN
ENGR:	----	SQUARE D COMPANY	
DATE:	MAY 30, 2001		
DRAWING STATUS:	RECORD	DWG# F15088342-001-01	PG 2 OF 4 REV -

REV	DESCRIPTION	BY	DATE

QED SWITCHBOARD GENERAL NOTES

PRODUCT DESCRIPTION AND RATINGS

POWER SYSTEM DATA:

208Y/120 3 PH 4 WIRE 60 HERTZ
SHORT CIRCUIT CURRENT RATING: 65kA RMS SYM

BUS SYSTEM DATA:

2500 AMPERES PLATED COPPER
CABLE FEED INCOMING BOTTOM LEFT
MULTI-SECTION WITH THRU-BUS
(4) .25x2.00 IN/6x51 mm Cu. BUS BARS PER PHASE
(4) .25x2.00 IN/6x51 mm Cu. NEUTRAL BUS
(1) .25x1.75 in/6x44 mm Cu. GROUND BUS

ENCLOSURE DATA:

NEMA TYPE 3R FREE STANDING W/FRONT DOORS
COLOR: ANSI 49
FRONT ACCESSIBILITY ONLY REQUIRED
HANDLING: ROLLERS
SEISMIC QUALIFICATION: ZONE 4

U.L. LABEL:

DEADFRONT AND SUITABLE FOR USE AS SERVICE ENTRANCE
WHEN NOT MORE THAN SIX MAIN DISCONNECTING MEANS ARE PROVIDED

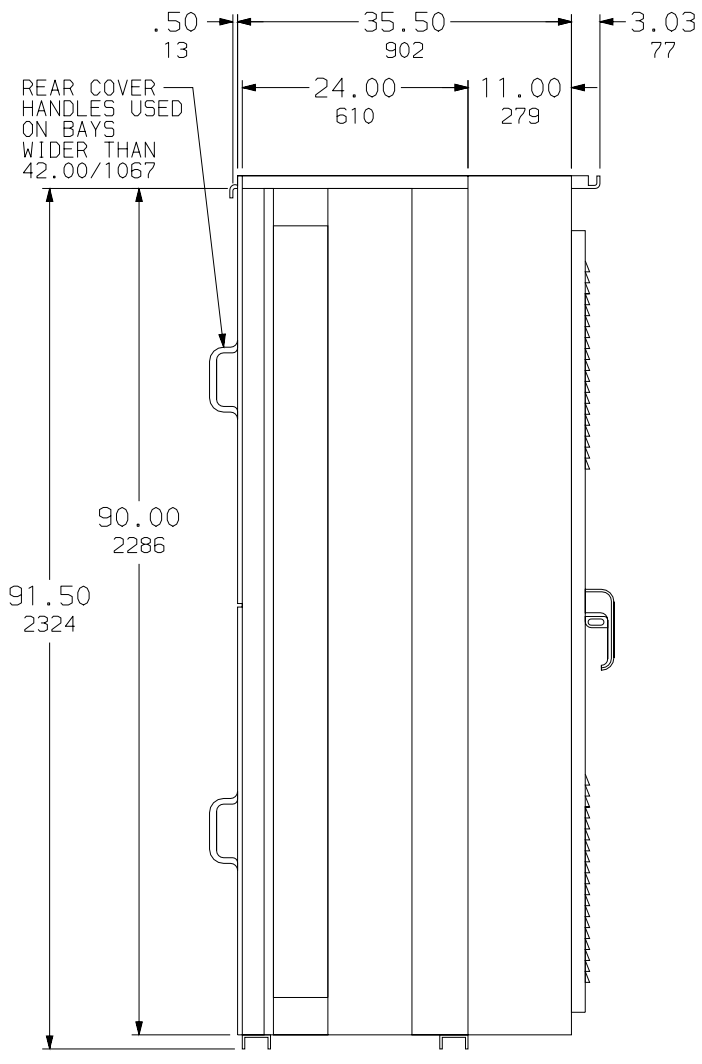
PRODUCT INFORMATION INSTRUCTION BULLETIN:

REFERENCE TO 80043-055-04 FOR HANDLING, INSTALLATION, ANCHORING, INSPECTION AND MAINTENANCE INFORMATION

LINEUP OPTIONS/ACCESSORIES:

JOB NAME:	TEMPLE ELEMENTARY SCHOOL	EQUIPMENT DESIGNATION:	Main Switchboard 'MS'
JOB LOCATION:	HACIENDA-LA PUENTE CA	EQUIPMENT TYPE:	POWER STYLE QED SWBD
DRAWN BY:	CAD	DRAWING TYPE:	GENERAL NOTES
ENGR:	----	SQUARE D COMPANY	
DATE:	MAY 30, 2001		
DRAWING STATUS:	RECORD	DWG# F15088342-001-01	PG 3 OF 4 REV -

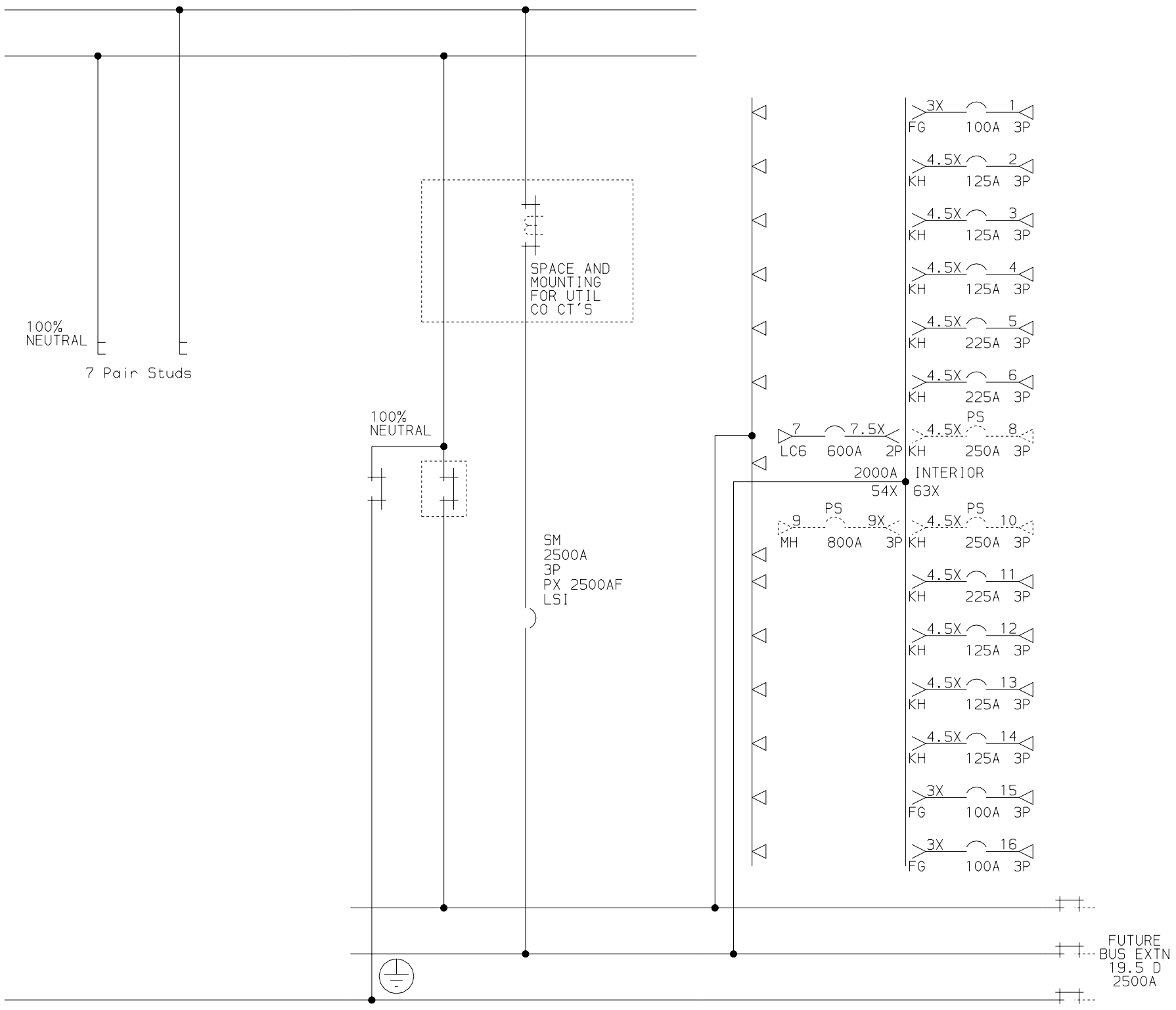
REV	DESCRIPTION	BY	DATE



LEFT SIDE VIEW

JOB NAME:	TEMPLE ELEMENTARY SCHOOL	EQUIPMENT DESIGNATION:	Main Switchboard 'MS'
JOB LOCATION:	HACIENDA-LA PUENTE CA	EQUIPMENT TYPE:	POWER STYLE QED SWBD
DRAWN BY:	CAD	DRAWING TYPE:	LEFT SIDE VIEW
ENGR:	----	SQUARE D COMPANY	
DATE:	MAY 30, 2001		
DRAWING STATUS:	RECORD	DWG# F15088342-001-01	PG 4 OF 4 REV -

REV	DESCRIPTION	BY	DATE



ONE LINE DIAGRAM

SECT 01 SECT 02 SECT 03

JOB NAME:	TEMPLE ELEMENTARY SCHOOL	EQUIPMENT DESIGNATION:	Main Switchboard 'MS'
JOB LOCATION:	HACIENDA-LA PUENTE CA	EQUIPMENT TYPE:	POWER STYLE QED SWBD
DRAWN BY:	CAD	DRAWING TYPE:	-----
ENGR:	----	SQUARE D COMPANY	
DATE:	MAY 30, 2001		
DRAWING STATUS:	RECORD	DWG# 015088342-001-01	PG 1 OF 2 REV -

REV	DESCRIPTION	BY	DATE

POWER STYLE QED-S SWITCHBOARD

SECT NO	CKT NO	DESIGNATION	N/P	AMPS/ POLES	TYPE/ FRAME	FUSE/ TRIP	TERM QTY	WIRE RANGE	ACCESSORY/WIRING
2	SM	2500A Main Breaker	NO	2500A/3P	PX 2500A	LSI		None	F*O*C2
3	1	åblank n/p!	NO	100A/3P	FG		1	#12-2/0	C2
3	2	åblank n/p!	NO	125A/3P	KH		1	#4-300	C2
3	3	åblank n/p!	NO	125A/3P	KH		1	#4-300	C2
3	4	Portable Classroom	NO	125A/3P	KH		1	#4-300	C2
3	5	åblank n/p!	NO	225A/3P	KH		1	#4-300	C2
3	6	åblank n/p!	NO	225A/3P	KH		1	#4-300	C2
3	7	Transformer T1	NO	600A/2P	LC 600A		2	4/0-500	C2
3	8	åblank n/p!	NO	250A/3PS	KH		1	#4-300	
3	9		NO	800A/3PS	MH		3	3/0-500	
3	10	åblank n/p!	NO	250A/3PS	KH		1	#4-300	
3	11	åblank n/p!	NO	225A/3P	KH		1	#4-300	C2
3	12	Portable Classroom	NO	125A/3P	KH		1	#4-300	C2
3	13	Portable Classroom	NO	125A/3P	KH		1	#4-300	C2
3	14	åblank n/p!	NO	125A/3P	KH		1	#4-300	C2
3	15	åblank n/p!	NO	100A/3P	FG		1	#12-2/0	C2
3	16	åblank n/p!	NO	100A/3P	FG		1	#12-2/0	C2

ACCESSORIES

C2 - PADLOCK ATTACHMENT

F* - LOCAL CURRENT AMMETER

O* - TRIP INDICATOR

JOB NAME:	TEMPLE ELEMENTARY SCHOOL	EQUIPMENT DESIGNATION:	Main Switchboard 'MS'
JOB LOCATION:	HACIENDA-LA PUENTE CA	EQUIPMENT TYPE:	POWER STYLE QED SWBD
DRAWN BY:	CAD	DRAWING TYPE:	SCHEDULE
ENGR:	----		SQUARE D COMPANY
DATE:	MAY 30, 2001		
DRAWING STATUS:	RECORD	DWG# 015088342-001-01	PG 2 OF 2 REV -

SECTION 27 05 28

PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Optical-fiber-cable pathways and fittings.
4. Surface pathways.
5. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior duct banks, manholes, and underground utility construction.
2. Division 26 Section "Raceways and Boxes for Electrical Systems" for conduits, wireways, surface raceways, boxes, enclosures, cabinets, hand holes, and faceplate adapters serving electrical systems.

1.03 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

B. IMC: Intermediate metal conduit.

C. EMT : Electrical Metallic Tubing

D. RNC: Rigid non Metallic Conduit (PVC Schedule 40)

1.04 ACTION SUBMITTALS

A. Product Data: For surface pathways, wireways and fittings, hinged-cover enclosures, and cabinets.

1.05 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For pathway racks, enclosures, cabinets, equipment racks and their mounting provisions, including those for internal components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.
4. Detailed description of conduit support devices and interconnections on which certification is based and their installation requirements.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.01 METAL CONDUITS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Tube & Conduit; a Tyco International Ltd. Co.
2. Southwire Company.
3. Thomas & Betts Corporation.
4. Wheatland Tube Company; a division of John Maneely Company.

B. General Requirements for Metal Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch, minimum.

F. EMT: Comply with ANSI C80.3 and UL 797.

G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Fittings for EMT:

a. Material: Steel.
b. Type: Compression.

2. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

H. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 NONMETALLIC CONDUITS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Tube & Conduit; a Tyco International Ltd. Co.
2. RACO; a Hubbell company.
3. Thomas & Betts Corporation.

B. General Requirements for Nonmetallic Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.

C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. Rigid HDPE: Comply with UL 651A.

E. Continuous HDPE: Comply with UL 651B.

F. RTRC: Comply with UL 1684A and NEMA TC 14.

G. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

H. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.03 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Endot Industries Inc.

2. IPEX.

3. Lamson & Sessions; Carlon Electrical Products.

B. Description: Comply with UL 2024; flexible-type pathway, approved for plenum riser, and general-use installation unless otherwise indicated.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Comply with TIA 569-B.

2.04 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.

2. Square D; a brand of Schneider Electric.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 or Type 3R unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Comply with TIA-569-B.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Screw-cover type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.05 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Moulded Products, Inc.

2. Hoffman; a Pentair company.

3. Lamson & Sessions; Carlon Electrical Products.

B. General Requirements for Nonmetallic Wireways and Auxiliary Gutters:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for

intended location and application.

2. Comply with TIA-569-B.

C. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

E. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.06 SURFACE PATHWAYS

A. General Requirements for Surface Pathways:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Comply with TIA-569-B.

B. Surface Metal Pathways: Galvanized steel with snap-on covers complying with UL 5. Prime coated, ready for field painting. Paint to match adjacent surface color.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Panduit Corp.
b. Wire mold / Legrand.
c. Hubbell Incorporated; Wiring Device-Kellems Division.

C. Surface Nonmetallic Pathways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from custom colors. Product shall comply with UL-94 V-0 requirements for self-extinguishing characteristics.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

a. Hubbell Incorporated; Wiring Device-Kellems Division.
b. Panduit Corp.
c. Wire mold / Legrand 5400 series

2.07 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hubbell Incorporated; Killark Division.

2. Thomas & Betts Corporation.

3. Wire mold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets:

1. Comply with TIA-569-B.

2. Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

E. 1-1/4-Inch Trade Size and Smaller: Install pathways in maximum

2.08 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND CABLING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.

2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

3. Comply with TIA-569-B.

4. May only be utilized when number of conduits in that route is never expected to exceed two four-inch conduits.

5. Fit with a hinged traffic lid with a minimum H-20 traffic rating and locking mechanism.

PART 3 - EXECUTION

3.01 PATHWAY APPLICATION

A. Outdoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.

2. Concealed Conduit, Aboveground: GRC RNC, Type EPC-40-PVC.

3. Underground Conduit: RNC, Type EPC-80-PVC, concrete encased.

a. Concrete shall be a cement/sand mix with a minimum compressive strength of 2,500 pounds per square inch after 28-days or a Class 2B mix with a maximum aggregate of three-eighths inch.
b. Back-fill with materials that have been sifted and mechanically compacted.
c. Install utilizing fixed spacers between all conduits. Orientation of conduits must be maintained from end-to-end, and the conduit support system should be secured within the trench to eliminate the potential fo the conduit "floating" when the concrete is poured.
d. All conduits must be burried a minimum of 24 inches below grade with marking tape 12 inches below the surface.
e. Minimum separation from other utilities a joint trench:

1) Power: 3 inches in concrete, 4 inches in masonry, or 12 inches in earth.
2) Other (Gas, Oil, Steam, water, etc.): 6 inches when crossing and 12 inches when in parallel.

f. All conduits to be installed witha nylon pull rope and plugged at both ends with a neoprene or rubber duct plug to prevent water and/or gas eepage into a building, tunnel, or vault.
g. Conduit entering a building must transition from PVC to galvanized rigid steel (GRC) or must be contained within a galvanized metal sleeve from a distance of 24 inches beyond the exterior of the foundation to six inches within the building.
h. Conduits entering a building shall slope downward away from the building to reduce potential for water entry.

4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.

2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC. Pathway locations include the following:
    a. Mechanical rooms.
    b. Gymnasiums
4. Concealed in Ceilings and Interior Walls and Partitions: EMT, or RNC, Type EPC-40-PVC.
5. Damp or Wet Locations: GRC.
6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical-fiber-cable pathway, Plenum-type, communications-cable pathway, or EMT.
7. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: EMT.
8. Pathways for Concealed General-Purpose Distribution of Optical-Fiber or Communications Cable: General-use, optical-fiber-cable pathway Plenum-type, optical-fiber-cable pathway Plenum-type, communications-cable pathway EMT.
9. Boxes and Enclosures: NEMA 250 Type 1, except use NEMA 250 Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Pathway Size: 1-1/4-inch trade size. Minimum size for optical-fiber cables is 2 inch.

D. Pathway Fittings: Compatible with pathways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealants recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.

E. Install surface pathways only as required. All locations shall be concealed where applicable. Notify architect of any surface pathways in areas viewable to public prior to installation..

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg

3.02 INSTALLATION

A. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are higher.

B. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

C. Complete pathway installation before starting conductor installation.

D. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches of enclosures to which attached.

I. Pathways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot intervals.
2. Arrange pathways to cross building expansion joints at right angles with expansion fittings.
3. Arrange pathways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to GRC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:
1. Use EMT, IMC, or RMC for pathways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

N. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

Q. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.

R. Surface Pathways:
1. Install surface pathway with a minimum 2-inch radius control at bend points.
2. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

S. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:
1. lengths of 50 feet.
2. 1-Inch Trade Size and Larger: Install pathways in maximum lengths of 75 feet.
3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

T. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with

listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway sealing fittings according to NFPA 70.

U. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service pathway enters a building or structure.
3. Where otherwise required by NFPA 70.

V. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

W. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC[and EMT] conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and qua11tity of fittings that accommodate temperature change listed for each of the following locations:
    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to top of box unless otherwise indicated.

Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

BB. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

CC. Set metal floor boxes level and flush with finished floor surface.

3.03 INSTALLATION OF UNDERGROUND HAND HOLES AND BOXES

A. Install hand holes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No.4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

E. Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.04 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 27 Section "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

3.05 FIRE STOPPING

A. Install fire stopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07 Section "Penetration Fire stopping."

3.06 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 27 05 44

SLEEVES AND SLEEVE SEALS FOR COMMUNICATIONS PATHWAYS AND CABLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Sleeves for pathway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Division 07 Section "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Laboratory Test Reports for Credit EQ 4: For sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 2 - PRODUCTS

2.01 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized-steel sheet.
2. Minimum MetaiThickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.02 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Advance Products & Systems, Inc.
b. CALPICO, Inc.
c. Pipeline Seal and Insulator, Inc.
d. Or Equal.

2. Sealing Elements: Nitrile (Buna N) rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe. ·

3. Pressure Plates: Stainless steel.

4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.03 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collarwith center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Presealed Systems.
b. Or Equal.

2.04 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.05 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

2. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.01 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint Comply with requirements in Division 07 Section "Joint Sealants."
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and pathway or cable unless sleeve seal is to be installed[or unless seismic criteria require different clearance].

4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.

2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installi11g mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between pathway or cable and sleeve for installing sleeve-seal system.

3.02 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at pathway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.03 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-sea! fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and

walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION

3

GENERAL SECTION 27 1000

REVISED 06-28-2023

PART 1 -

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this Section.

B. Division 26 - Electrical.

C. Division 27 - Communications.

1.2 PROJECT OVERVIEW

A. The project is the construction of a new Performing Arts Complex for the Hacienda La Puente Unified School District.

1.3 APPROVED STRUCTURED CABLING MANUFACTURER(S)

A. The following are approved structured cabling manufacturers for the project. Requests to propose alternate manufacturers shall be in writing. Approval of alternate manufacturers is at the discretion of the Owner and/or Technology Consultant.

1. Belden.
2. CommScope Uniprise.
3. Approved equal.

B. Only full and complete structured cabling systems shall be installed. All cable and components shall be from one manufacturer or approved for use by the manufacturer to complete the system. Systems consisting of mixed cable and components from multiple manufacturers that are not defined as a complete structured cabling system by a single manufacturer are not acceptable.

1.4 CONTRACTOR REQUIREMENTS AND CABLING SYSTEM WARRANTY

A. The Structured Cabling Contractor (SCC) shall be certified to install the system by the manufacturer of the proposed system.

B. The SCC must be able to offer the manufacturer's system warranty for the system proposed. Such warranty will cover all cable and components installed as part of the manufacturer's cabling system and shall include a performance warranty that guarantees the horizontal and backbone cabling system will support the performance specifications as stated in ANSI/TIA/EIA-568-C. Copper links shall be warranted to the link performance minimum expected results defined in ANSI/TIA/EIA-568-C.2. Fiber-optic links shall be warranted to the link and segment performance minimum expected results defined in ANSI/TIA/EIA-568-C.1.

C. Minimum System warranty period shall be 20 years.

D. Should a SCC be awarded the work as described in this section and subsequent sections that is not certified by the manufacturer to install the system and provide to the owner the warranty as described, the General Contractor (GC) shall be responsible to make good on all deficiencies including, but not limited to, all costs associated with replacement of cable and/or components, qualified labor to install or reinstall cable and/or components, testing and certifying the system per manufacturer's requirements and providing to the owner the warranty described.

E. All components, material, and workmanship not covered by the manufacturer's system warranty shall be guaranteed for one (1) year after the date of final acceptance.

1.5 SYSTEM DESCRIPTION

A. Furnish and install a data and/or voice cabling infrastructure system that will support a multi-product, multi-vendor environment.

B. The structured cabling plan shall be designed, installed and administered according to the TIA/EIA telecommunications infrastructure standards and shall be equipment and cable vendor independent.

C. The mechanical properties and transmission categories of all components used, including all wire/cable and all connecting hardware shall be Category 6 compliant for all horizontal voice and data cable links.

D. The data communications for the project shall consist of Owner furnished network equipment. The SCC shall furnish and install a structured cabling system able to support up to and including Gigabit Ethernet.

E. The voice communications equipment for the project will be provided by others. The SCC shall furnish and install a structured cabling system able to support the Owners voice requirements including VoIP.

F. Horizontal Cabling

1. Furnish and install Category 6, 4-pair UTP cables for all horizontal data and/or voice links from the telecommunications outlet to the patch panel located in the Telecommunications Room (TR). Drawings note the quantity to provide at the outlet.
2. Provide cable rated for the installation space. Where cables pass through more than one type of rated space (e.g., non-plenum and plenum), provide the highest rated cable to meet code requirements.
3. The maximum horizontal cable distance from the telecommunications outlet to the horizontal cross-connect within the telecommunication rooms shall be 295 feet.
4. Unless otherwise noted, all conduits will be provided by the Electrical Contractor (EC).

G. Telecommunications Outlets

1. All telecommunications outlets shall consist of 2-position, 8-wire modular RJ-45 Category 6 jack(s) at noted locations on drawings. Drawings note the quantity to provide at the outlet.
2. Telecommunications outlets may be located in walls, floors, ceilings or in systems furniture. Drawings note the type of outlet at each location.
3. Terminate all horizontal data and/or voice cables according to the TIA/EIA 568B wiring scheme unless otherwise noted.

4. Data and/or voice faceplates shall be a 2-port configuration unless otherwise noted. Coordinate color with architect. Provide blank inserts for unused ports where required.

5. Wall phone faceplates shall be a single port configuration with two mounting studs.

H. Telecommunications Room (TR)

1. The MDF shall serve as the Entrance Room for the telecommunications provider.

2. Furnish and install freestanding equipment racks that will contain horizontal and backbone copper patch panels, fiber optic termination hardware and owner supplied and installed equipment. Verify locations and requirements with the Technology Consultant, Architect/Engineer and Owner prior to installation.

3. Telecommunications Rooms shall be designed and provisioned according to the requirements in TIA/EIA Standard 569B and the construction documents.

4. Category 6 modular to IDC termination patch panels comprise the horizontal cross-connect portion of the data and/or voice cables. Patch panels shall provide the mechanical terminations of the horizontal cabling from the telecom outlets and the associated cross-connection of the cable to network hardware via contractor furnished and owner installed patch cables.

5. Category 6 modular jacks used in the patch panels shall be un-keyed 4-pair. The jacks shall be color coded for both T568A and T568B wiring. Modular jacks shall be UL listed and meet or exceed the requirements of TIA/EIA 568B.2-1.

1.6 SCOPE OF WORK

A. The work covered under this section of the specifications consists of furnishing all labor, materials, consumables, tools, services and facilities and in performing all operations, including installation of wire and cable, telecommunication outlets and faceplates, patch panels, wiring blocks, racks, horizontal and vertical wire management, cable support, grounding and bonding, testing and labeling and all other functions necessary for the complete installation of a structured cabling system supporting data networking, telecommunications, distribution of CATV signals or other low-voltage systems in accordance with the specifications and drawings, except as specifically noted otherwise.

B. The SCC shall coordinate with other trades and vendors prior to the start of work.

C. The work of this section shall include, but not be limited to furnishing and installation of the following:

1. Category 6 unshielded twisted-pair horizontal cables.

2. Laser Optimized OM4 Multimode fiber optic cable.

3. Singlemode fiber optic cable if applicable.

4. Telecommunications outlets/connectors and faceplates.

5. Category 6 Modular-to-IDC patch panels (data and voice horizontal cable).

6. Build out of Telecommunications Rooms as needed.

7. As required: ladder rack, and J-hooks including all necessary support hardware and fittings.

8. Grounding and bonding.

9. Firestopping of telecommunications pathways that penetrate fire-rate wall, floors, and ceilings.

10. Category 6 patch cables for voice/data cross-connects in telecommunications rooms.
11. Laser Optimized Multimode and Single Mode fiber optic jumper cables.
12. All materials necessary for complete and proper cable management.
13. Testing all copper and fiber cabling.
14. Labeling all copper and fiber cabling, faceplates and patch panels/wiring blocks.
15. Furnishing as-built documentation including floor plans showing outlet labels and test reports.

1.7 WORK SPECIFICALLY EXCLUDED AND PROVIDED BY OTHERS ARE AS FOLLOWS:

A. Fire Alarm cabling.

B. Security systems and devices including video surveillance cameras, recording equipment, access control panels, access control devices, intrusion detection devices and specialty cable.

C. Paging and intercom systems and cable including speakers and intercom units.

D. Network hardware such as core switches, workgroup switches, routers, firewalls and other Customer Premise Equipment.

E. Telephone system hardware such as telephone hand-sets, PBX systems, Remote Shelves, servers, software, tail cables, and other associated telephone equipment hardware.

F. Computer systems and peripherals such as servers, workstation computers and printers.

G. Outlet boxes for data/voice, CATV outlets and IP based security devices shall be furnished and installed by the EC under applicable sections of Division 26 and the drawings.

H. Conduits and raceways necessary to provide complete Structured Cable System pathways, in conformance with applicable sections of Division 26 and the drawings.

I. Floor cores and conduit sleeves shall be furnished and installed by the EC under other Division 26 sections and the drawings.

J. 120/208 volt AC power for technology equipment as specified in and in accordance with applicable sections of Division 26 and the drawings.

K. Grounding bus bar in TRs and ERs shall be furnished and installed by the EC under Division 26 and Division 27 and the drawings.

L. HVAC required to provide conditioned air or other means of proper cooling for Technology equipment and spaces.

1.8 REFERENCES, REGULATIONS AND CODE COMPLIANCE

A. All workmanship and materials shall conform to and be installed, inspected and tested in accordance with the governing rules and regulations of federal, state and local governmental agencies.

B. All workmanship and materials shall conform to the latest industry standards and publications referenced in this section as applicable:

1. ANSI/TIA/EIA – 568-C Commercial Building Telecommunications Cabling Standard.
2. ANSI/TIA/EIA – 569-B Commercial Building Standard for Telecommunications Pathways and Spaces.
3. ANSI/TIA/EIA – 606-A Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
4. ANSI/TIA-607-B Commercial Building Grounding and Bonding Requirements for Telecommunications Standard.
5. NFPA 70 – National Electric Code.
6. BICSI – Telecommunications Distribution Methods Manual, 12th Edition.
7. NEMA – VE-2 – Metal Cable Tray Installation Guidelines.
8. TIA TSB-140 Additional Guidelines for Field- Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.
9. ASTM E-814 – Fire Tests of Through Penetration Fire Stops.
10. UL 1479 – Fire Tests of Through Penetration Firestop.
11. Underwriters Laboratory (UL).
12. Federal Communications Commission (FCC).
13. National Electrical Manufacturers Association (NEMA).

1.9 DEFINITIONS

Approved/Approval:	Written permission to use a material or system.
As Called for:	Materials, equipment including the execution specified/shown in the contract documents.
Code Requirements:	Follow minimum code requirements.
Concealed:	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
EC:	Electrical Contractor.
Entrance Facility (EF):	An entrance to a building for both public and private network service cables (including wireless) including the entrance point at the building wall and continuing to the entrance room or space. (TIA)
Equal/Equivalent:	Equally acceptable as determined by Owner's Representative.
Equipment Room (ER):	An environmentally controlled centralized space for telecommunications equipment that usually houses a main or intermediate cross-connect. (TIA) sometimes referred to as the MDF. May include computer or server rooms.
Existing:	Equipment, device, and material present in an installation location prior to new work.
Exposed:	Work not identified as concealed.
Final Acceptance:	Owner acceptance of the project from Contractor upon certification by Owner's representative.
Furnish:	Supply and deliver to installation location.
Furnished By Others:	Furnished by someone other than contractor of specified system.

Inspection:	Visual observation of specified equipment or system.
Install:	Mount and connect equipment and associated material ready for use.
Labeled:	Marked with a machine produced designation.
Owner:	The end user and/or owner of equipment/system.
Relocate:	Disassemble, disconnect and transport equipment to new location.
Replace:	Remove and provide new item.
Review:	A general contractual conformance check of specified design and materials.
Rough-in:	Gang boxes and/or conduit for specified system.
Structured Cabling Contractor (SCC):	Contractor furnishing and installing telecommunications, security, or other low-voltage cable called out as part of the specifications and drawings. May also be referred to as the Telecommunications Contractor (TC).
Telecommunication Room (TR):	An enclosed architectural space for housing telecommunications equipment, cable terminations, and cross-connect cabling. (TIA) Also known as the IDF.

1.10 INTENT OF DRAWINGS

A. The drawings are diagrammatic unless detailed dimensions are included. Drawings show close approximate locations of equipment and devices. Exact locations are subject to the approval of Owner and Owner's representative.

B. Anything mentioned in the specifications and not shown in the drawings or shown in the drawings and not mentioned in the specifications, shall be of like effect as if shown and mentioned in both. In case of differences between the specifications and drawings, the stricter provision, as determined by the project coordinator, shall govern. Omissions from the drawings or specifications, or the incorrect description of details of work which are evidently necessary to carry out the intent of the drawings and specifications, shall not relieve the contractor from performing such work.

1.11 REVIEW OF CONTRACT DOCUMENTS

A. The SCC shall carefully study the Contract Documents and report to the consultant and project manager any error, inconsistency, or omission they may discover. If contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Contract Documents without such notice to the consultant or project manager, the contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable cost for correction.

B. The SCC must verify all dimensions locating the work and its relation to any existing work, all existing conditions and their relation to the work, and all man-made obstructions and conditions, etc., affecting the completion and proper execution of the work as indicated by the Contract Documents.

1.12 EXAMINATION OF THE PREMISES

A. The SCC shall visit the site to familiarize themselves with the local conditions under which the work is to be performed and correlate observations with the requirements of the Contract Documents. No allowance will be made for claims of concealed conditions which contractor, in exercise of reasonable diligence in the observation of the site and the review of the local conditions under which the work is to be performed, has learned or should have learned, unless otherwise specifically agreed by owner and consultant in writing.

B. Before ordering any materials or performing any work, the contractor shall verify all measurements. No extra charge or compensation will be allowed for duplicate work or material required because of an unverified difference between an actual dimension and the measurement indicated in the drawings. Any discrepancies shall be submitted in writing to the Project Manager and Consultant for consideration before proceeding with the work.

1.13 SUBMITTALS

A. Submittals shall include product data literature and adequate descriptive literature, catalog cut sheets, and other data necessary for the Technology Designer and Architect/Engineer to ascertain that the proposed equipment and materials comply with the specification requirements.

B. Product data submittals shall consist of technical data sheets, manufacturers' specifications, illustrations, standard schedules, performance charts, instructions, brochures, diagrams and test data furnished to illustrate a product, material or system for the work to be performed. Product data literature is required on all items of material and equipment and shall be clearly marked, identifying specific items proposed.

C. Clearly indicate on each submittal set the items being submitted by marking or highlighting each item to clearly indicate to the reviewer items being submitted.

D. Provide submittals in quantities requested by the architect, engineer or general contractor. Provide submittals with bid responses if so requested.

E. Prior to assembling or installing the work, shop drawings shall be submitted for review and approval.

F. The SCC shall not purchase any materials or equipment for incorporation into the project prior to receipt of reviewed Submittals from the Technology Designer and/or Architect/Engineer.

G. Review of product data shall not relieve the SCC from responsibility for deviations from the drawings or specifications, unless the contractor has, in writing, called attention to such deviations at the time of submission and secured written approval.

H. The SCC shall develop and submit complete Submittals and do so in a timely manner. By failing to do so, the contractor agrees to be fully responsible for any and all damages, which might be incurred through the failure to do so.

I. Samples may be requested; which shall be physical examples, which represent materials, equipment, or workmanship and establish standards by which the work will be judged.

1.14 QUALITY ASSURANCE

A. All equipment shall equal or exceed the minimum requirements of NEMA, ASME, ANSI and Underwriters Laboratories.

B. All material and equipment furnished shall be new, unused, and free from defects. Equipment shall be clean and free of damage and corrosion and shall be of the best quality obtainable for the purpose intended.

C. Where more than one of any specified item of equipment or material is required, such items shall be the product of one manufacturer throughout the facility.

D. All materials used shall bear labels attesting to Underwriters Laboratory approval, provided a standard is established for the material in question.

E. All materials shall conform strictly to the standards and specifications set forth in this document. Unless otherwise specified, all products furnished shall be designed, built and installed in accordance with the latest and best practice of the electrical and telecommunications industry, and shall conform to the standards of the NEMA, ANSI, TIA/EIA, ICEA, IEEE, NEC and this specification wherever they apply.

1.15 CONTRACTOR QUALIFICATIONS

A. The SCC shall have a full working knowledge of low voltage applications such as, but not limited to data, voice, and CATV distribution systems. The contractor shall have the following qualifications:

1. Possess those licenses/permits required to perform telecommunications and other low voltage installations in the specified jurisdiction.
2. Have personnel trained and certified in the design and installation of the manufacturer's structured cabling system and equipment. Specifically, the SCC shall possess Belden CSV or CommScope Uniprise partner designation and be shown on the appropriate manufacturer's website as such.
3. The SCC shall provide proof of current certification in the design and installation of the manufacturer's structured cabling system and equipment.
4. The SCC shall provide the resume of the project manager assigned to oversee the installation.
5. The SCC shall have a minimum of five (5) years of experience and five (5) years in business in this specialized field and shall have completed a minimum of three (3) projects similar in scope and size to this project.
6. Have personnel knowledgeable in local, state and national codes and the latest BICSI and Telecommunications Standards.
7. Provide proof of insurance for liability and workmen's compensation for all personnel on the jobsite.
8. SCC personnel will be required to provide and use the proper tools in the performance of each activity. The tools must be in good working order. The Owner reserves the right to review the tool lists and tool maintenance procedures of the SCC.
9. Other contractor qualifications as described in Division 01.

1.16 COORDINATION

A. The SCC shall contact the General Contractor and the Technology Consultant once project is awarded and prior to construction to discuss project approach, schedule and coordination.

B. The SCC shall provide and submit a weekly progress report once installation has begun. This report shall be provided to the General Contractor and a copy sent directly to the Technology Consultant.

C. The SCC shall coordinate the work of this Section with that of other Sections and Divisions as required ensuring that the entire work of this project will be carried out in a complete and coordinated fashion.

D. The SCC shall supply all necessary supervision and coordination of information to any subcontractor or installer who is performing related work to minimize interferences.

E. The SCC shall coordinate the installation of cabling, technology devices, and cable pathways with the work of other Divisions to ensure complete and proper installation of technology pathways, spaces and outlets. Coordinate telecommunications room requirements such as plywood, paint, power, lighting, grounding, flooring and room security with the General Contractor so as not to impede the installation schedule.

F. The SCC shall coordinate the installation of voice cross-connects at termination blocks/patch panels with the Owner.

G. The SCC shall be responsible for performing interconnections unless noted otherwise. Both the Owner and SCC shall coordinate “as-built”, circuit identification and labeling information for complete project records.

H. The locations of technology devices and equipment are diagrammatically expressed on drawings. Exact locations of items of work shall be field coordinated. The SCC shall report any discrepancies between locations of devices on the drawings and work performed by the other trades to the General Contractor using the approved procedures within three days of discovery.

1.17 CLEANUP

A. The SCC will endeavor to keep telecommunications rooms clean and free of debris particularly when terminating fiber optic cables.

B. The SCC will clean-up work areas at the end of each day and remove trash or other debris.

C. Food and drink containers will not be permitted in telecommunications rooms or data centers at any time.

1.18 PERMITS, LICENSES AND INSPECTIONS

A. The SCC shall furnish and file with the proper authorities all drawings required by them in connection with this work. The SCC, if required, shall obtain all official permits, licenses and inspections and shall pay all legal and proper fees and charges.

B. The SCC shall, at inception of the work, provide the Project Engineer with copies of all required building and trade permits.

C. The SCC shall be responsible for arranging all inspections and for securing all required signatures. Upon completion of the work, properly completed permits shall be returned to the Project Coordinator, if any are required.

1.19 PROTECTION OF MATERIALS AND EQUIPMENT

A. Materials and equipment shall be protected from damage during shipment, storage at the site and throughout the construction period. No damaged items shall be installed and immediate steps shall be taken to obtain replacement so as not to interrupt construction schedule.

B. Coordinate site storage of materials and equipment with the General Contractor or Owner.

C. If required by the General Contractor, provide a lockable container for material and equipment storage.

1.20 SITE SAFETY AND ACCESS

A. Determine from General Contractor all job site requirements such as access, parking and material storage areas.

B. Telecommunications technicians working on the job shall follow all safety procedures set by the General Contractor. Technicians must furnish their own safety equipment including but not limited to hard hats, safety glasses, proper footwear (confirm if steel toed boots/shoes are required), fall arrest equipment and safety vests. All safety equipment must be in good working order.

C. Attend all safety orientations and meetings required by the General Contractor.

D. Provide to General Contractor up to date MSDS information in a 3-ring binder listing materials planned for use on the job site that require MSDS information. Provide the number of copies requested.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS MINIMUM REQUIREMENTS

A. Provide materials that meet the following minimum requirements:

1. Cabling and components shall be by the manufacturer specified or an approved equal unless no substitutions are allowed. Where no manufacturer is specified, cable and/or components shall meet or exceed the performance specifications given.

2. Electrical equipment and systems shall meet UL standards and requirements of the NEC. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.

3. Equipment shall meet all applicable FCC regulations.

4. All materials, unless otherwise specified, shall be new, unused and the standard products of the manufacturer. Used equipment or damaged material will be rejected.

5. The listing of a manufacturer as “acceptable” does not indicate acceptance of a standard or catalogued item of equipment. All equipment and systems must conform to the Specifications and meet the quality of the design make.

6. Where applicable, all materials and equipment shall bear the label and listing of Underwriters Laboratory or Factory Mutual Application and installation of all equipment and materials shall be in accordance with such labeling and listing.

2.2 WORKMANSHIP, SUBSTITUTIONS AND WARRANTY

A. Materials and workmanship shall meet or exceed industry standards and be fully eligible for the maximum guarantee offered by the manufacturer. All components, material and workmanship not covered by the manufacturer’s system warranty shall be guaranteed for one (1) year after the date of final acceptance. Cable integrity and associated terminations shall be thoroughly inspected, fully tested, and guaranteed as free from defects, transpositions, opens, shorts, kinks, damaged jacket insulation, or similar conditions that may compromise system performance.

B. All labor must be thoroughly competent and skilled, and all work shall be executed in strict accordance with the best practice of the trades.

C. The SCC shall be responsible for and make good, without expense to the Owner, any and all defects arising during this warranty period that are due to imperfect materials, appliances, improper installation or poor workmanship.

D. After a Contract is awarded, requests to substitute for previously approved materials shall be submitted by the SCC to the Project Engineer within seven (7) days, complete with reasons for substitution and savings which accrue to Owner if substitutes are approved. Substitutes, after Contract award, will be considered only if equal or superior to that specified.

E. Approval of alternate or substitute equipment or material in no way voids Contract document requirements.

F. Under no circumstances shall the Owner be required to prove that an item proposed for substitution is not equal to the specified item. It shall be mandatory that the SCC submit to the Owner all evidence to support his contention that the item proposed for substitution is equal to the contract specified item. The Owner’s decision as to the equality of substitution shall be final and without further recourse.

G. The SCC will be certified by the manufacturer to install the cabling system and to furnish to the Owner a system warranty that has a minimum period of 20 years. Such warranty will cover all cable and components installed as part of the manufacturer’s cabling system and shall include a performance warranty that guarantees the horizontal and backbone cabling system will support the performance specifications as stated in ANSI/TIA/EIA 568-C. Copper links shall be warranted to the link performance minimum expected results defined in ANSI/TIA/EIA-568-C.2-1. Fiber-optic links shall be warranted to the link and segment performance minimum expected results defined in ANSI/TIA/EIA-568-C.1.

H. The SCC shall provide the manufacturer’s system warranty for both parts and labor for the warranty period upon final acceptance of the system by Owner. The SCC shall provide a copy of the warranty certificate to the Architect/Engineer and Owner for review.

PART 3 - EXECUTION

3.1 STRUCTURED CABLING

A. All material and equipment shall be installed in a neat and workmanlike manner.

B. All material and equipment shall be installed per manufacturer's specifications using methods and tools approved by the manufacturer.

C. All material and equipment shall be installed per the drawings and specifications.

D. The installation shall be in compliance with the requirements of the NEC, OSHA and the rules, regulations and requirements of the FCC.

E. The installation shall be in compliance with federal, state, county and city laws, regulations, ordinances and codes applicable to the installation.

F. The locations of conduits, conduit sleeves, outlet boxes, floor boxes, stub-ups, panels, equipment racks and other related equipment as indicated on the drawings are approximate and are understood to be subject to such revision as may be found necessary at the time of installation. The SCC should have exact and definite locations accepted by the Owner before proceeding with the installation.

G. For telecommunications outlets in wall mounted applications, the Electrical Contractor shall furnish and install a 4" square by 2-1/8" deep gang box with a single-gang mud ring reducer for flush mounting single gang faceplates in the wall space along with a minimum 1" conduit from the gang box to cable pathways located in accessible spaces. Provide pull strings in all conduits for the SCC.

H. For telecommunications outlets in floor mounted applications, the Electrical Contractor shall furnish and install floor boxes including covers and adapters suitable for installation of telecommunications outlets within the floors and any floor duct or conduits necessary to convey cable to wireways in accessible spaces. Conduits shall be sized appropriately to handle planned cable counts and sizes. Provide adapters designed to mount the specified manufacturer's jacks.

I. The SCC shall furnish and install cable pathways to fully support all installed cable. Pathways may consist of J-hooks or slings rated for Category 6 cable, wire mesh cable tray or ladder rack as called out in the drawings and/or specifications. The SCC shall coordinate cable pathway installation with other trades so as not to impede their work.

J. The SCC shall furnish and install ladder rack within the telecommunications rooms as shown on the drawings. The ladder rack shall include all accessories for a complete routing system. Ladder rack shall be bonded to the room TMGB/TGB with a minimum #6 AWG bonding conductor.

K. The SCC shall furnish and install equipment racks, frames or cabinets as called out in the drawings and/or specifications. Racks, frames and cabinets shall be bonded to the room TMGB/TGB with a minimum #6 AWG bonding conductor.

L. The SCC shall furnish and install all cable hangers, horizontal and vertical wire managers, cross-connect managers and other cable management hardware for a neat and orderly installation.

M. Horizontal cabling shall not be spliced and must be continuous from the cross-connect to the workstation outlets. SCC will neatly dress all horizontal cable from point of entry in equipment rooms and telecommunications rooms to the termination point. Provide cable slack as specified. Where cable slack is specified, neatly support slack with cable slings or similar methods. Do not store cable slack on ladder racks.

N. The proximity of horizontal and backbone cabling to electrical facilities that generate high levels of electromagnetic interference (EMI) shall be taken into account. These facilities include, but are not limited to copiers, motors, transformers and fluorescent lighting.

O. All horizontal copper UTP cables shall be terminated according to the T568B wiring scheme unless otherwise specified.

3.2 FIRESTOPPING

A. All telecommunication pathways that penetrate fire-rated walls, floors or ceilings shall be properly firestopped, per the applicable codes and shall be the responsibility of the SCC unless otherwise noted.

B. Provide fire-resistant UL approved firestopping systems to restore fire ratings to all wall, floor or ceiling penetrations. Firestopping systems must be UL classified and meet NEC and local codes.

C. All penetrations through fire rated floors and walls shall be sealed to prevent the passage of smoke, fire, toxic gas or water through the penetration, before, during or after a fire. The fire rating of the penetration seal shall be at least that of the floor or wall into which it is installed, so the original fire rating of the floor or wall is maintained as required by Article 300-21 of the NEC.

D. No flammable material may be used to line the chase or hole in which the firestop material is to be installed.

E. All firestopping materials shall be installed in accordance with the manufacturer's directions and recommendations.

F. The sealant shall remain resilient and pliable to allow for the removal and/or addition of cable without the necessity of drilling holes. It shall adhere to itself in order to allow any and all repairs to be made with the same material. It shall allow for vibration, expansion and/or contraction without affecting the seal, cracking, crumbling and spalling.

G. The firestop sealant shall comply with the fire-exposure and hose-stream endurance requirements of ASTM E-119.

3.3 LABELING

A. Cable labels shall provide a unique identification scheme that shall ease cable tracing. The SCC shall coordinate with the Owner to determine any Owner required labeling schemes prior to labeling cables and termination equipment. If Owner does not furnish a cabling administration scheme, the SCC shall submit intended labeling scheme to the Technology Consultant, Architect/Engineer and Owner for approval.

B. Labels shall be permanent, waterproof, and readable from one foot with permanent lettering and shall not be removable by normal cable handling or normal operations. As part of the final installation, no hand written labels will be allowed. All labels shall be typed or computer generated.

C. Verify labeling for all cables, termination blocks, patch panels and racks with Owner prior to installation.

D. All cables shall be labeled at each end. For proper administration, additional cable labeling may be required on the cable at intermediate locations such as conduit ends and along cable tray and cable support runs.

3.4 TESTING

A. The SCC shall test 100% of all cables installed. Telecommunications cables shall meet or exceed the current ANSI/TIA/EIA-568 specifications for the category of cable installed. All test reports shall be printed and included in the final record documentation package.

B. UTP Copper Cable

1. The SCC shall be responsible for recording all test data.
2. Copies of all test results are to be submitted to the Technology Consultant or authorized representative for review prior to submission to the Owner. Cable test results shall be part of the final record documentation package and remain with the Owner for their records.
3. Category 6 cabling systems shall be performance verified using an automated test set. Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the ANSI/TIA/EIA-568 standard, and the result shown as pass/fail. Test results shall be printed directly from the test unit or from a download file using an application from the test equipment manufacturer. The printed test results shall include all tests performed, the expected test result and the actual test result achieved. The test shall be a permanent link test, unless otherwise specified by the manufacturer.

C. Fiber Optic Backbone Cable

1. Follow procedures described in TIA/EIA TSB-140 for Tier 1 tests when testing intrabuilding fiber optic backbone cables. Multimode links are to be tested at 850 nm and 1300 nm in accordance with ANSI/TIA/EIA-526-14-A, Method B, One Reference Jumper. Singlemode links are to be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA/EIA-526-7, Method A.1, One Reference Jumper. Test fibers in one direction unless otherwise directed.
2. Test for system attenuation using a power meter and light source set to the same wavelength. Power meter must be calibrated and traceable to the National Institute for Standards and Technologies (NIST).
3. Test jumpers must be of the same optical fiber core size as the cabling system under test.
4. Test 100% of installed fiber. Provide printed test reports for inclusion in final record documentation package. Test reports will show measured loss for each fiber in dB and length of each fiber in feet.
5. End to end testing is considered to be from the equipment end through the cross-connect to the terminal end.

D. Testing Fiber Optic Backbone Cable

1. Follow procedures described above for testing intra-building fiber optic cable plus TSB 140 Tier 2 procedures to include OTDR testing.
2. Include all OTDR trace documentation with final record package.

E. Coaxial Cables
   1. Test all coaxial cables for continuity, shorts and opens.

END OF SECTION 27 10 00

SECTION 27 11 00

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Telecommunications mounting elements.
2. Backboards.
3. Telecommunications equipment racks and cabinets.
4. Grounding.

B. Related Requirements:

1. Division 27 Section "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.
2. Division 27 Section "Communications Horizontal Cabling" for voice and data cabling associated with system panels and devices.

1.03 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. LAN: Local area network.

C. RCDD: Registered Communications Distribution Designer.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of RCDD/NTS.
2. Installation Supervision: Installation shall be under the direct supervision of Level2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
3. Field Inspector: Currently registered by BICSI as RCDD to perform the on-site inspection.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Equipment frames shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2.02 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements for plywood backing panels specified in Division 06 Section "Rough Carpentry."

2.03 EQUIPMENT FRAMES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

1. Belden Inc.
2. Cooper 8-Line.
3. Hubbell Premise Wiring.
4. Leviton Commercial Networks Division.
5. Ortronics, Inc.
6. Panduit Corp.

C. General Frame Requirements:

1. Distribution Frames: Freestanding and wall-mounting, modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
2. Module Dimension: Width compatible with EIA 310-D standard, 19-inch panel mounting.
3. Finish: Manufacturer's standard, baked-polyester powder coat.

D. Floor-Mounted Racks: Modular-type, steel construction.

1. Vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug, and a power strip.
2. Baked-polyester powder coat finish.

E. Modular Freestanding Cabinets:

1. Removable and lockable side panels.
2. Hinged and lockable front and rear doors.
3. Adjustable feet for leveling.
4. Screened ventilation openings in the roof and rear door.
5. Cable access provisions in the roof and base.
6. Grounding bus bar.
7. Rack -mounted, 550-cfm fan with filter.
8. Power strip.
9. Baked-polyester powder coat finish.
10. All cabinets keyed alike.

F. Modular Wall Cabinets:

1. Wall mounting.
2. Steel or aluminum construction.
3. Treated to resist corrosion.
4. Lockable front and rear doors.
5. Louvered side panels.

6. Cable access provisions top and bottom.
7. Grounding lug.
8. Rack-mounted, 250-cfm fan.
9. Power strip.
10. All cabinets keyed alike.

G. Cable Management for Equipment Frames:

1. Metal, with integral wire retaining fingers.
2. Baked-polyester powder coat finish.
3. Vertical cable management panels shall have front and rear channels, with covers.
4. Provide horizontal crossover cable manager at the top of each relay rack, with a minimum height of two rack units each.

2.04 POWER STRIPS

A. Power Strips: Comply with UL 1363.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Rack mounting.
3. Six, 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R receptacles.
4. LED indicator lights for power and protection status.
5. LED indicator lights for reverse polarity and open outlet ground.
6. Circuit Breaker and Thermal Fusing: Unit continues to supply power if protection is lost.
7. Cord connected with 15-foot line cord.
8. Rocker-type on-off switch, illuminated when in on position.
9. Peak Single-Impulse Surge Current Rating: 33. kA per phase.
10. Protection modes shall be line to neutral, line to ground, and neutral to ground. UL 1449 clamping voltage for all three modes shall be not more than 330 V.

2.05 GROUNDING

A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems." for grounding conductors and connectors.

B. Telecommunications Main Bus Bar:

1. Connectors: Mechanical type, cast silicon bronze, solderless compression -type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
2. Ground Bus Bar: Copper, minimum 1/4 inch thick by 8 inches wide with 9/32-inch holes spaced 1-1/8 inches apart.
3. Stand-Off Insulators: Comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

C. Comply with J-STD-607-A.

2.06 LABELING

A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.01 ENTRANCE FACILITIES

A. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and a housing when so directed by service provider.

B. Comply with requirements in Division 27 Section "Pathways for Communications Systems" for materials and installation requirements for underground pathways.

3.02 INSTALLATION

A. Comply with NECA 1.

B. Comply with BICSI TDMM for layout and installation of communications equipment rooms.

C. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

D. Coordinate layout and installation of communications equipment with Owner's telecommunications and **LAN** equipment and service suppliers. Coordinate service entrance arrangement with local exchange carrier.

1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.

2. Record agreements reached in meetings and distribute them to other participants.·

E. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

3.03 SLEEVE AND SLEEVE SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 27 Section "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

3.04 FIRE STOPPING

A. Comply with requirements in Division 07 Section "Penetration Firestopping."

B. Comply with TIA-569-B, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.05 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with J-STD-607-A

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 2AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No.6 AWG equipment grounding conductor.

1. Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces.

3.06 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A.

Comply with requirements in Division 26 Section "Identification for Electrical Systems."

B. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Labels shall be preprinted or computer-printed type.

END OF SECTION

SECTION 27 13 00

COMMUNICATIONS BACKBONE CABLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Pathways.
2. UTP cable.
3. OS2 single mode Indoor/outdoor, optical fiber cabling.
4. PE- 89 copper cable.
5. PA Speaker Cables
6. Clock System cable
7. Cable connecting hardware, patch panels, and cross-connects.
8. Managed Ethernet copper- Fiber media converter (10/100/1000) with integrated management , Net Gear or equal (to be approved by district), 8 port (RJ 45) Gigabit switch (managed network solution).
9. Industrial grade media converters with PoE, Blackbox # LGC5310A with power supplies (120VAC- 52-57VDC, 25.5W/UTP port), DIN rails and other type Media converters as applicable.
10. Cabling identification products.

B. Related Sections:

1. Division 27 Section "Cable Trays for Communication Systems".

1.03 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

C. EMI: Electromagnetic interference.

D. IDC: Insulation displacement connector.

E. LAN: Local area network.

F. RCDD: Registered Communications Distribution Designer.

G. UTP: Unshielded twisted pair.

1.04 BACKBONE CABLING DESCRIPTION

A. Backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.

B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters shall not be used as part of backbone cabling.

1.05 PERFORMANCE REQUIREMENTS

A. General Performance: Backbone cabling system shall comply with transmission standards in TINEIA-568-B.1, when tested according to test procedures of this standard.

1.06 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. For coaxial cable, include the following installation data for each type used:

a. Nominal OD.
b. Minimum bending radius.
c. Maximum pulling tension.

B. Shop Drawings:

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.

2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.

3. Cabling administration drawings and printouts.

4. Wiring diagrams to show typical wiring schematics including the following:

a. Cross-connects.
b. Patch panels (Fiber & Copper)
c. Patch cords.

5. Cross-connects and patch panels. Detail mounting assemblies and show elevations and physical relationship between the installed components.

6. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:

a. Vertical and horizontal offsets and transitions.
b. Clearances for access above and to side of cable trays.
c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field-testing program development by an RCDD.

2. Installation Supervision: Installation shall be under the direct supervision of Level2 Installer, who shall be present at all times when Work of this Section is performed at Project site.

3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.

2. Smoke-Developed Index: 50 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70,

by a qualified testing agency, and marked for intended location and application.

D. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A

E. Grounding: Comply with ANSI-J-STD-607-A

1.08 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.

1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.

2. Test optical fiber cable while on reels.Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.

3. Test each pair of UTP cable for open and short circuits.

1.09 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.10 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

1.11 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning with Substantial Completion, provide software support for two years.

B. Upgrade Service: Update software to latest version at Project completion.

C. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.

1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

PART 2 - PRODUCTS

2.01 PATHWAYS

A. General Requirements: Comply with TIA/EIA-569-A.

B. Cable Support NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.

1. Support brackets with cable tie slots for fastening cable ties to brackets.

2. Lacing bars, spools, J-hooks, and D-rings.

3. Straps and other devices.

2.02 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated,3/4 by 48 by 96 inches. Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels.

2.03 UTP CABLE

A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Belden CDT Inc.; Electronics Division or approved equal by District ITS.

B. Description: 100-ohm, 100 -pair UTP, formed into 25-pair binder groups covered with a gray thermoplastic jacket and overall metallic shield.

1. Comply with ICEA S-90-661 for mechanical properties.

2. Comply with TIA/EIA-568-B.1 for performance specifications.

3. Comply with TIA/EIA-568-B.2, Category 6.

4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types: ·

a. Communications, General Purpose: Type CM or CMG; or MPP, CMP, MPR, CMR, MP, or MPG.
b. Communications Plenum Rated: Type CMP or MPP, complying with NFPA 262.
c. Communications Riser Rated: Type CMR; or MPP, CMP, or MPR, complying with UL 1666.
d. Communications, Limited Purpose: Type CMX; or MPP, CMP, MPR, CMR, MP, MPG, CM, or CMG.
e. Multipurpose: Type MP or MPG; or MPP or MPR.
f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA262.
g. Multipurpose, Riser Rated: Type MPR or MPP, complying with UL 1666.

C. Category 6 DATA CABLE

a. (BLUE) CMR – Belden 3613 D 151000 (Indoor) & Belden OSP6U (Outdoor).

2.04 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by:

1. Belden – or approved equal by District ITS.

B. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Belden – AX103253 (24 port); AX104228 (48 port)

2. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.

C. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integraiiDC-type terminals.

a. Key Connect Voice Outlet – Belden AX101320
b. Key Connect Data Outlet - Belden AX104193
c. Weatherproof Data Outlet – Belden E100601
d. Wall Plate and Port Box Belden AX102660/AX102655 (wall), Belden AX102651 (Ceiling), Belden E00002 (Exterior Wall).

D. Patch Cords: Factory-made, 4-pair cables in 48-inch1200-mmlengths; terminated with 8-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.

2. Patch cords shall have color-coded boots for circuit identification.

3. 4 feet Cat 6 Patch Cords – Belden C601106004 & W.P Belden E 601002 (Exterior WAP)

2.05 OPTICAL FIBER CABLE

A. Manufacturers: Subject to compliance with requirements, provide products:

1. Belden approved equal by District ITS.

B. Description: Single mode 12 strand OS2 - fiber, nonconductive, tight buffer, non-armored indoor/outdoor Gel filled optical fiber cable with LC type connectors.

1. Comply with ICEA S-83-596 for mechanical properties.

2. Comply with TIA/EIA-568-B.3 for performance specifications.

3. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:

a. Riser Rated, Conductive: Type OFNR -LS (ETL), complying with UL 1666, UL 1685

4. Conductive cable shall be steel armored type.

C. Jacket:

1. Jacket Color: Black.

2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B.

3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.

D. 4 Strand OS2 Indoor/Outdoor Fiber Backbone Cable – Belden FSD04R9; 12 strand OS2 Indoor/Outdoor Fiber Backbone Cable – Belden FSD012R9. 50/125 Micron MM Cable by Belden where required.

2.06 OPTICAL FIBER CABLE HARDWARE must be compatible with District standards and match existing.

A. Manufacturers: Subject to compliance with requirements, provide products:

1. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors. Patch Cords: Factory-made, dual-fiber cables in 36-inch lengths. LC OS2 3 ft Fiber Patch Cords - Belden FP1SD; Belden – 2RU Fiber Patch panel – ECX-02U; 6 port Duplex Fiber bulk Head – Belden FF1X06LD; Blank Bulk Head – Belden FFZX00BB; approved equal by District ITS.

B. Cable Connecting Hardware:

1. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.

2. Quick-connect, simplex and duplex, Type LC connectors. Insertion loss not more than 0.75 dB.

3. Fiber LC Fusion Splice on Connector – Belden FT1LC900FS0; 4 port Fiber Wall Plate Belden AX101248 & 6 port Key Connect side entry box Belden AX102654 (Besides Media Converter)

2.07 PE -89 Exchange Cable in compliance with ANSI ICEA 7CFR – 1755-089 (Gofer Resistance cables): Superior ESSEX 6/12/25 Pair OSP rated 22 AWG.

2.08 Public Address System Cable: 2 # 22 AWG Shielded West Penn # 355 (Indoor) & Tip – Ring Outdoor Rated 2# 18 AWG Shielded West Penn AQC 293.

2.09 Clock Cable: 3 # 14 THHN/THWN (Red/Black/White) Cerro wire (03,01,02)

2.10 Terminal Cabinet: 12”x12”x 4” for PA & Clock systems. Weather Proof when installed outdoor. Provide terminal blocks for wire terminations.

2.11 IDF Cabinets: Mid Atlantic # CWR – 26 - 32 -PD & CWR -12 – 32 - PD with fire rated plywood backing. Provide Horizontal & Vertical wire managers

2.12 Media Converters, Network Switches (12 port/8 Port – Net Gear) & Industrial Grade Media Converters with PoE – Blackbox # LGC5310A with power supplies & Extenders: Provide standalone media converters as required for OS2 to 50/125 micron MM, Fiber to Copper compatible with Communication cabling required.

2.13 GROUNDING

A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems." for grounding conductors and connectors.

B. Comply with ANSI-J-STD-607-A.

2.14 IDENTIFICATION PRODUCTS

A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.15 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test cables on reels according to TIA/EIA-568-B.1.

C. Factory test UTP cables according to TIA/EIA-568-B.2.

D. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.M

E. Cable will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

PART 3 - EXECUTION

3.01 ENTRANCE FACILITIES

A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.02 WIRING METHODS.

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.

2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."

B. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.03 INSTALLATION OF PATHWAYS

A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A.

B. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Section "Communications Equipment Room Fittings." Drawings indicate general arrangement of pathways and fittings.

C. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

D. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.

E. Install manufactured conduit sweeps and long-radius elbows whenever possible.

F. Pathway Installation in Communications Equipment Rooms:

1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.

2. Install cable trays to route cables if conduits cannot be located in these positions.

3. Secure conduits to backboard when entering room from overhead.

4. Extend conduits 3 inches above finished floor.

5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

G. Backboards: Install backboards with 96-inch dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.

3.04 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA/EIA-568-B.1.

2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."

3. Install110-style IDC termination hardware unless otherwise indicated.

4. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.

5. Cables may riot be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

6. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.

7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.

8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

9. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.

10. In the communications equipment room, install a 10-foot-long service loop on each end of cable.

11. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.

2. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:

1. Comply with TIA/EIA-568-B.3.

2. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

E. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.

2. Suspend UTP cable not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.

3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Outdoor Coaxial Cable Installation:

1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed 0-rings to keep out moisture.

2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches.

G. Group connecting hardware for cables into separate logical fields.

3.05 FIRE STOPPING

A. Comply with requirements in Division 07 Section "Penetration Firestopping."

B. Comply with TINEIA-569-A, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.06 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.07 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TINEIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

1. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

B. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Comply with requirements in Division 27 Section "Communications Horizontal Cabling" for cable and asset management software.

D. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List

incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, [backbone pathways and cables,] [entrance pathways and cables,] terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.

F. Cable and Wire Identification:

1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.

3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.

4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

   a. Individually number wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device with name and number of particular device as shown.
   b. Label each unit and field within distribution racks and frames.

5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIAIEIA 606-A, for the following:

1. Cables use flexible vinyl or polyester that flexes as cables are bent.

3.08 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. C. Tests and Inspections:

1. Visually inspect UTP and optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-8.1.

2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

3. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

   a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-8.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that

are qualified by test equipment manufacturer for channel or link test configuration.

4. Optical Fiber Cable Tests:
    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-8.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
    b. Link End-to-End Attenuation Tests:
        1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526..:.14-A, Method B, One Reference Jumper.
        2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-8.1.

D. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

E. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

F. End-to-end cabling will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

END OF SECTION

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. UTP cabling.
2. 62.5/125-micrometer, optical fiber cabling.
3. Coaxial cable.
4. Multiuser telecommunications outlet assemblies.
5. Cable connecting hardware, patch panels, and cross-connects.
6. Telecommunications outlet/connectors.
7. Cabling system identification products.
8. Cable management system.

B. Related Requirements:

1. Division 27 Section "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.

1.03 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.

C. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

D. EMI: Electromagnetic interference.

E. IDC: Insulation displacement connector.

F. LAN: Local area network.

G. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.

H. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.

I. RCDD: Registered Communications Distribution Designer.

J. UTP: Unshielded twisted pair.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate layout and installation of telecommunications cabling with Owner's telecommunications and LAN equipment and service suppliers.

B. Coordinate telecommunications outlet/connector locations with location of power receptacles

at each work area.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For coaxial cable, include the following installation data for each type used:

a. Nominal OD.
b. Minimum bending radius.
c. Maximum pulling tension.

B. Shop Drawings:

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.

2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.

3. Cabling administration drawings and printouts.

4. Wiring diagrams to show typical wiring schematics, including the following:

a. Cross-connects.
b. Patch panels.
c. Patch cords.

5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For splices and connectors to include in maintenance manuals.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.

2. Program Software Backup: On magnetic media or compact disk, complete with data files.

3. Device address list.

4. Printout of software application and graphic screens.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.

2. Installation Supervision: Installation shall be under the direct supervision of Level·2 Installer, who shall be present at all times when Work of this Section is performed at Project site.

3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

B. Testing Agency Qualifications: An NRTL.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.

1. Test optical fiber cables to determine the continuity of the strand end to end. Use optical fiber flashlight or optical loss test set.

2. Test optical fiber cables while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; including the loss value of each. Retain test data and include the record in maintenance data.

3. Test each pair of UTP cable for open and short circuits.

PART 2 - PRODUCTS

2.01 HORIZONTAL CABLING DESCRIPTION

A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called a "permanent link," a term that is used in the testing protocols.

1. TIAIEIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.

2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.

3. Bridged taps and splices shall not be installed in the horizontal cabling.

4. Splitters shall not be installed as part of the optical fiber cabling.

B. A work area is approximately 100 sq. ft., and includes the components that extend from the telecommunications outlet/connectors to the station equipment.

C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

2.02 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1 when tested according to test procedures of this standard.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.

2. Smoke-Developed Index: 50 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Grounding: Comply with J-STD-607-A

2.03 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels.

2.04 UTP CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

1. Belden Inc.

2. Mohawk; a division of Belden Networking, Inc.

3. Superior Essex Inc.

C. Description: 100-ohm, four-pair UTP, formed into 25-pair, binder groups covered with a blue thermoplastic jacket.

1. Comply with ICEA S-90-661 for mechanical properties.

2. Comply with TIA/EIA-568-B.1 for performance specifications.

3. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

a. Communications, General Purpose: Type CM or CMG; or MPP, CMP, MPR, CMR, MP, or MPG. .
b. Communications, Plenum Rated: Type CMP or MPP, complying with NFPA 262.
c. Communications, Riser Rated: Type CMR; or MPP, CMP, or MPR, complying with UL 1666.
d. Communications, Limited Purpose: Type CMX; or MPP, CMP, MPR, CMR, MP, MPG, CM, or CMG.
e. Multipurpose: Type MP or MPG; or MPP or MPR.
f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
g. Multipurpose, Riser Rated: Type MPR or MPP, complying with UL 1666.

2.05 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Inc.

2. Hubbell Premise Wiring.

3. Panduit Corp.

B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

C. Connecting Blocks: 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

D. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.

E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

F. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integraiiDC-type terminals.

G. Patch Cords: Factory-made, four-pair cables in 48-inch lengths; terminated with eight-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.

2. Patch cords shall have color-coded boots for circuit identification.

2.06 OPTICAL FIBER CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Inc.

2. Mohawk; a division of Belden Networking, Inc.

3. Superior Essex Inc.

B. Description: Multimode, 62.5/125-micrometer, 24 -fiber, nonconductive, tight buffer, optical fiber cable.

1. Comply with ICEA S-83-596 for mechanical properties.

2. Comply with TIA/EIA-568-B.3 for performance specifications.

3. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:

a. General Purpose, 1\lonconductive: Type OFN or OFI\IG, or OFNR, OFNP.
b. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
c. Riser Rated, Nonconductive: Type OFNR or OFNP, complying with UL 1666.
d. General Purpose, Conductive: Type OFC or OFCG; or OFNG, OFN, OFCR, OFNR, OFCP, or OFNP.
e. Plenum Rated, Conductive: Type OFCP or OFNP, complying with NFPA 262.
f. Riser Rated, Conductive: Type OFCR; orOFI\IR, OFCP, or OFNP, complying with LIL 1666.

4. Conductive cable shall be steel armored type.

5. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.

6. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

C. Jacket:

1. Jacket Color: Orange for 62.5/125-micrometer cable.

2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.

3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.

2.07 OPTICAL FIBER CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Inc.

2. Corning Cable Systems.

3. Hubbell Premise Wiring.

B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.

C. Patch Cords: Factory-maded; ual-fiber cables in 36-inch lengths.

D. Cable Connecting Hardware:

1. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA-604-2-B, TIA-604-3-B, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.

2. Quick-connect, simplex and duplex, Type SC connectors.Insertion loss not more than 0.75 dB.

2.08 COAXIAL CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Inc.

2. CommScope, Inc.

B. Cable Characteristics: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.

C. RG-11/U: NFPA 70, Type CATV.

1. No. 14 AWG, solid, copper-covered steel conductor.
2. Gas-injected, foam-PE insulation.
3. Double shielded with 100 percent aluminum polyester tape and 60 percent aluminum braid.
4. Jacketed with sunlight-resistant, black PVC or PE.
5. Suitable for outdoor installations in ambient temperatures ranging from minus 40 to plus 85 deg C.

D. RG59/U: NFPA 70, Type CATVR.

1. No. 28 AWG, solid, silver-plated, copper-covered steel conductor.
2. Gas-injected, foam-PE insulation.
3. Triple shielded with 100 percent aluminum polyester tape and 95 percent aluminum braid; covered by aluminum foil with grounding strip.
4. Color-coded PVC jacket.

E. RG-6/U: NFPA 70, Type CATV or CM.

1. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
2. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
3. Jacketed with black PVC or PE.
4. Suitable for indoor installations.

F. RG59/U: NFPA 70, Type CATV.

1. No. 18 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
2. Double shielded with 100 percent aluminum polyester tape and 40 percent aluminum braid.
3. PVC jacket.

G. RG59/U (Plenum Rated): NFPA 70, Type CMP.

1. No. 18 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation.
2. Double shielded with 100 percent aluminum-foii shield and 65 percent aluminum braid.
3. Copolymer jacket.

H. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70 "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:

1. CATV Cable: Type CATV, or CATVP or CATVR.
2. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
3. CATV Riser Rated: Type CATVR; or CATVP, CATVR, or CATV, complying with UL 1666.
4. CATV Limited Rating: Type CATVX.

2.09 COAXIAL CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Emerson Network Power Connectivity Solutions.

2. Leviton Commercial Networks Division.

B. Coaxial-Cable Connectors: Type BNC, 75 ohms.

2.10 CONSOLIDATION POINTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Inc.

2. Chatsworth Products, Inc.

3. Hubbell Premise Wiring.

B. Description: Consolidation points shall comply with requirements for cable connecting hardware.

1. Number of Terminals per Field: One for each conductor in assigned cables.

2. Number of Connectors per Field:

a. One for each four-pair UTP cable indicated.
b. One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.

2.11 MULTIUSER TELECOMMUNICATIONS OUTLET ASSEMBLY (MUTOA)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Inc.

2. Chatsworth Products, Inc.

3. Hubbell Premise Wiring.

B. Description: MUTOAs shall meet the requirements for cable connecting hardware.

1. Number of Terminals per Field: One for each conductor in assigned cables.

2. Number of Connectors per Field:

a. One for each four-pair UTP cable indicated.
b. One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.

3. NRTL listed as complying with UL 50 and UL 1863.

4. Label shall include maximum length of work area cords, based on TINEIA-568-B.1.

5. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.

2.12 TELECOMMUNICATIONS OUTLET/CONNECTORS

A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TINEIA-568-B.1.

B. Workstation Outlets: Four-port-connector assemblies mounted in single or multigang faceplate.

1. Plastic Faceplate: High-impact plastic. Coordinate color with Division 26 Section "Wiring Devices."

2. Metal Faceplate: Stainless steel, complying with requirements in Division 26 Section "Wiring Devices."
3. For use with snap-in jacks accommodating any combination of UTP, optical fiber, and coaxial work area cords.
    a. Flush mounting jacks, positioning the cord at a 45-degree angle.
4. Legend: Factory labeled by silk-screening or engraving for stainless steel.
5. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.13 GROUNDING

A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.

B. Comply with J-STD-607-A.

2.14 IDENTIFICATION PRODUCTS

A. Comply with TINEIA-606-A and LIL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

2.15 CABLE MANAGEMENT SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. iTRACS Corporation, Inc.
2. TeiSoft Solutions.

B. Description: Computer-based cable management system, with integrated database and graphic capabilities.

C. Document physical characteristics by recording the network, TIA/EIA details, and connections between equipment and cable.

D. Information shall be presented in database view, schematic plans, or technical drawings.

2.16 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.

C. Factory test UTP cables according to TIA/EIA-568-B.2.

D. Factory test multimode optical fiber cables according to TIA-526-14-A and TIA/EIA-568-B.3.

E. Factory-sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.

F. Cable will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

PART 3 - EXECUTION

3.01 ENTRANCE FACILITIES

A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.02 WIRING METHODS

A. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal pathways and cables except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements in Division 27 Section "Pathways for Communications Systems."
3. Comply with requirements in Division 27 Section "Cable Trays forCommunications Systems."

B. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures:

1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
2. Install lacing bars and distribution spools.
3. Install conductors parallel with or at right angles to sides and back of enclosure.

3.03 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSIITSIM, Ch. 6, "Cable Termination Practices."
3. lnstall110-style IDC termination hardware unless otherwise indicated.
4. MUTOA shall not be used as a cross-connect point.
5. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:
   a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
   b. Locate consolidation points for UTP at least 49 feet from communications equipment room.
6. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
8. Install lacing bars to restrain cables, to prev nt straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.

12. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
13. Pulling Cable: Comply with BICSIITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:
1. Comply with TIA/EIA-568-8.2.
2. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:
1. Comply with TIA/EIA-568-8.3.
2. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

E. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable 6 feet long not less than [12 inches] **<Insert size>** in diameter below each feed point.

G. Outdoor Coaxial Cable Installation:
1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed 0-rings to keep out moisture.
2. Attach antenna lead-in cable to support structure at intervals not .exceeding 36 inches.

H. Group connecting hardware for cables into separate logical fields.

3.04 FIRE STOPPING

A. Comply with requirements in Division 07 Section "Penetration Firestopping."

B. Comply with TIA-569-B, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.05 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with J-STD-607-A

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No.6 AWG equipment grounding conductor.

3.06 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIAIEIA-606-A Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

B. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.

C. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

D. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, [backbone pathways and cables,] [entrance pathways and cables,] terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIAIEIA-606-A Furnish electronic record of all drawings, in software and format selected by Owner.

F. Cable and Wire Identification:

1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.

3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.

4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

   a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
   b. Label each unit and field within distribution racks and frames.

5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

6. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOAiabe!.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.

1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.07 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and

inspect components, assemblies, and equipment installations, including connections.

C. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

D. End-to-end cabling will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.08 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning with Substantial Completion, provide software support for two years.

B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion.

Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.

1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

3.09 DEMONSTRATION

A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets. Include training in cabling administration software.

END OF SECTION

SECTION 27 41 00

REVISED 06-28-2023

AUDIO-VIDEO SYSTEMS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide all labor, equipment and materials for a complete and satisfactory operating audiovisual system for the Hacienda La Puente Unified School District Performing Arts Center.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this Section.

B. Division 26 Electrical

C. N/A

D. N/A

1.03 DEFINITION OF TERMS

A. The term “Owner” shall refer to

B. The term “General Contractor” shall refer to XXXX.

C. The term “Consultant” shall refer to HJSA Consulting

D. The term “Architect” shall refer to Rachlin Partners.

E. The term “Contractor” shall refer to the successful bidder, who has the responsibility for installation and performance of the work specified herein.

1.04 SYSTEM DESCRIPTION

A. Auditorium

1. The Audio system shall consist of two (2) hanging speaker assemblies, amplifiers, digital audio console, digital processors and a control system. Microphone input panels are located as shown on the drawings. An input for local sources shall be located at the Stage Manager’s position.

2. Hanging speaker assemblies, left, and right, shall be assembled as follows:

a. The Sub-woofer component shall be at the top.

b. The Hi Mid Bass component boxes shall be below the Sub-woofer.

3. Assemblies shall be hung using industry certified hardware designed specifically for this purpose.

a. Use speaker manufacturer's support and rigging hardware where possible.

b. Riggers must be ESTA certified and show proof of certification.

c. The method of attachment to the building must be reviewed and approved by a structural engineer before installation.

d. Assemblies shall be mounted and rigged to the elevation and azimuth angles as shown on the drawings.

e. Properly gauged wire must be used for all low impedance connections.

4. The Video system shall consist of a projector, projector lift and projection screen, located as shown on the drawings, with two (2) Blu-ray DVD players, one (1) at the stage managers position and one (1) at the FOH position. Three (3) 55" displays shall be provided and placed across the front of the stage and connect to as needed to the three (3) floor boxes as needed for video presentations.

5. Inputs that support digital sources shall be located as follows:

a. In wall-mounted boxes located as shown on the drawings.
b. The stage manager's position, two (2) inputs.
c. FOH, three (3) inputs

6. The Stage Manager's position shall have a touch panel for controlling the audiovisual system, an audio monitor panel, intercom station and an announce microphone.

7. The FOH position shall have a touch panel for controlling the audiovisual system.

8. The system shall operate in two modes:

a. Standalone

b. In Standalone mode a button push on the touch panel shall:

1) Turn on the audiovisual system and lower the projection screen.

2) Adjust one (1) wireless microphone to a preset level.

3) Adjust the (2) microphone inputs located in FB-3 to a preset level.

4) Select FB-3 as the video source and display the laptop or other connected device on the projection screen.

5) Preset the video source audio level.

c. Operator Mode

d. In Operator Mode a push button on the touch panel shall:

1) Turn on the audiovisual system

2) Switch the output of the audio console to the speakers.

3) The projector and projection screen, as well as all other systems functions shall be controlled from the touch panel located at the FOH position.

9. Control of the system shall be via touch screen control panels located at the Stage Manager position and the Control Booth. Control of the system shall include but not be limited to:

    a. System ON/OFF

    b. Standalone

    c. Operator

    d. Standalone Master Volume UP/DOWN

    e. Projector ON/OFF

    f. Projection Screen UP/DOWN

    g. Video Source Selection

    h. Audio Source Selection

    i. Audio Mute

    j. Video Blank

    k. House Lights

    l. Preview Monitor Source Selection

10. A two (2) channel intercom system shall be provided with a rack mount station at the Stage Manager's position and the Lighting Director's position.

    a. The system shall be connected as shown on the drawings.

11. A wall mounted connection points to the intercom system shall be provided on stage, in the Auditorium, Orchestra Pit, and other back of house locations including, Dressing Rooms and Shop.

    a. A wall mounted intercom station shall be provided for the Green Room.

12. Eight (8) wired belt packs with headset/microphone shall be provided.

13. A High Definition Pan/Tilt/Zoom camera shall be provided and located and connected as shown on the drawings. The camera shall connect to a High Definition recorder that receives an audio feed from the audio system

14. Program and Preview monitors are provided at the Stage Manager and the FOH position.

15. A wireless RF assisted listening system shall be provided for use by the hearing impaired. The RF receiver shall tune to a single channel and the user shall not be able to change the channel. The receiver shall have a multifunction display that indicates battery status, inventory number and channel. The device shall have the

option of being lanyard or belt clip worn and the lanyard shall have the options of an integrated DSP driven neck loop that automatically senses and sends optimized audio signals directly to hearing aids and cochlear implants equipped with telecoils. The devices will incorporate automatic battery charging circuitry and use a non-proprietary lithium ion battery. The system shall include:

a. One (1) iDSP Prime Level III 72MHz System that includes:

1) One (1) Stationary RF transmitter operating at 72MHz with coverage range of 1500ft.

2) One (1) Universal Antenna Kit (72MHz and 216MHz).

3) One (1) Universal Rack Mounting Kit.

4) Four (4) Intelligent DSP RF Receivers (72MHz).

5) Four (4) Universal Ear Speakers.

6) Two (2) Intelligent Earphone/Neck Loop Lanyards.

7) One (1) Intellligent12-Unit Charging Tray.

8) One (1) Assistive Listening Notification Kit.

b. In addition the following items shall be added:

1) Ten (10) Intelligent DSP RF Receivers (72MHz).

2) Ten (10) Universal Ear Speakers.

3) Two (2) Intelligent Earphone/Neck Loop Lanyards.

4) One (1) Intellligent12-Unit Charging Tray.

c. The total quantities of Intelligent Receivers, Ear Speakers and Intelligent Earphone/Neck Loop Lanyards shall meet California requirements for this facility which are as follows:

1) Quantity Fourteen (14) Receivers

2) Quantity Fourteen (14) Ear Speakers

3) Quantity Four (4) Earphone/Neck Loop Lanyards

See Section 2 for complete parts list.

1.05 QUALIFICATIONS

A. Provide written and verifiable evidence of each of the listed qualifications:

1. The bidders must demonstrate that they have the experience, capability and resources to perform the work and complete according to schedule.

2. The Contractor shall meet all applicable regulations.

3. The Contractor shall be a firm normally employed in the commercial and performance A/V industry.

B. The Contractor must adhere to industry engineering, installation and testing standards and utilize the authorized manufacturer components and distribution channels.

C. The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size.

D. The Contractor shall own and maintain tools and equipment necessary for successful installation, equalization and testing of the systems and have personnel who are adequately trained in the use of such tools and equipment.

E. A resume of qualifications shall be submitted with the Contractor's proposal indicating the following:

1. A list of five recently completed projects using the product proposed of similar type and size with contact names and telephone numbers for each.

2. A technical resume of experience for the Contractor's Project Manager and on-site installation Supervisor who shall be assigned to this project.

3. Be a direct dealer for key equipment

4. Bondable to one (1) percent or as required on the project

1.06 CONTRACTOR'S RESPONSIBILITIES

A. The intent of this specification is to provide the groundwork for a complete and satisfactory operating system. All equipment and installation material required to fulfill the above shall be furnished whether or not specified or on the drawings.

B. The work herein specified shall be performed by fully competent workers, in a thorough manner. All work shall be completed to the satisfaction of the Consultant and Owner.

C. The Contactor will provide shop drawings and cut sheets for review and approval before any work will commence. This will include all information necessary for the complete wiring and installation of the system.

D. The Contractor shall provide touch panel renditions and control system step-by-step operation for review and approval by Consultant and Owner prior to uploading software and GUI files.

E. The Contractor will provide a schedule for fabrication, rack builds, cable pulls, equipment installation, termination and acceptance testing.

F. The Contractor will provide on-site coordination with other trades and on-going supervision for the project.

G. Any questions concerning this document should be addressed in writing to:

H. Howard Steele: hsteele@hjsaconsulting.com

I. The Contractor shall provide training sessions as described in this document.

J. The Contractor is responsible for providing weekly status reports to the General Contractor and the Consultant outlining the progress on the project. The following should be included in this status report:

1. Date of project submittals

2. Percentage of completion of rack fabrication and other in-house work

3. Percentage of completion of wire pulls and other wire installation

4. Date of equipment arrival on-site

5. Percentage of completion of wire termination and equipment installation

6. Non-conformance to schedule or other issues

K. All materials and equipment supplied by the Contractor shall be new, the latest model and meet or exceed the published specifications of the manufacturer, unless otherwise approved by the Consultant.

L. Equipment substitutions of equal or better are allowed unless noted.

M. All equipment shall meet applicable code requirements.

N. Standards:

1. All work shall be performed in accordance with the latest revisions of the following standards and codes:

a. Local Building Codes

b. Local Electrical Codes

c. NEC National Electrical Code

O. Other references:

1. ANSI/TIA/EIA-569-B - Commercial Building Standard for Telecommunications Pathways and Spaces

2. ANSI/TIA/EIA-607-A - Commercial Building Grounding and Bonding Requirements for Telecommunications

3. ISO/IEC 11801 - Generic Cabling Standard

4. ANSI/IEEE C62.41-1991 Recommended practice on Surge Voltages in Low Voltage AC Power Circuits

5. UL -1283 Standard for Safety - Electromagnetic Interference Filters

6. UL -1449, 2nd Edition Standard for Safety - Transient Voltage Surge Suppressors

7. NFPA 70 National Electrical Code

8. NFPA 75 Standard for the Protection Electronic Computer Systems

9. CCITT National Electrical Manufacturers Association; (NEMA LS1-1992 Guidelines) Low Voltage Surge Protection Devices.

P. Prior to beginning any work, the Contractor will submit the following:

1. Shop drawings, showing all manufacturers' product model and type.

2. Number identification for all cables and wires.

3. Detailed information on the input and output connections for each device.

4. Drawings of rack equipment locations.

5. Details of any custom design devices.

Q. At the completion of all work, the Contractor shall submit two (2) copies of the following:

1. Test results for all systems

2. "As-Built" drawings

3. Systems Operation and Maintenance Manuals

4. Any software specifically written for the project

5. Source code for all systems must be provided

6. All details specific to the software-equipment functionality

7. List of all MAC addresses, IP addresses, ports, etc., for all equipment attached to the Owner's networks.

1.07 SUB-CONTRACT

A. No sub-contract will be permitted for the Contractor's responsibilities, unless specifically identified in the bid submission and approved by the Owner and Consultant.

B. Should sub-contractor be utilized, the Contractor shall have sole responsibility for the satisfactory implementation and performance of the system.

1.08 SYSTEM WARRANTY REQUIREMENTS

A. Warranty Statement

1. The Contractor shall include a statement of warranty on the installed system and all equipment. The warranty period shall be for one (1) year from the date of acceptance or the first beneficial use, whichever is first, against defective materials, design, workmanship and improper adjustment. Any defective material shall be removed, repaired or replaced and installed at no cost to the Owner, provided it does not show abuse.

2. The Contractor shall warranty all equipment for that period, superseding the manufactures warranty where necessary. The warranty shall include all costs incurred by the Contractor for removing, repairing and re-installing malfunctioning equipment.

3. Some Manufacturers require that only authorized dealers install and warranty their equipment. If the Manufacturer does not authorize the Contractor, it is the Contractor's responsibility to make the appropriate arrangements and bear all cost and consequences of that arrangement.

4. The warranty shall include a four (4) site visits to perform preventive maintenance, repairs and adjustments as necessary to insure that the system performance meets specifications.

C. All manufacturers' equipment warranties are to be activated in the Owner's name and will commence on the date of system acceptance. The Contractor will warrant contractor-modified equipment for the warranty period described above.

D. Support

1. The Contractor will respond to a request for service within two (2) hours by telephone and onsite support, if required, will occur within twenty-four (24) hours after the request for service.

2. Telephone support will be available during the Contractor's published normal business hours Monday through Friday.

E. Service Contract

1. The Contractor shall offer a separate service contract for two (2) years on a year-to-year basis. This service contract shall cover a minimum of four (4) visits per year and scheduled as per the Owner's request, to perform preventive maintenance, repairs and adjustments, as necessary.

2. The service contract will include the scheduled replacement of lamps for projectors and other display devices. This contract should also include adjustment of equipment to maintain optimum image and sound quality as well as maintaining all other components of all installed systems to meet the specifications of this document.

3. The service contract shall commence immediately after expiration of the warranty period.

4. The contract should include separate costs and contact information for emergency and after hour's service.

1.09 EQUIPMENT DELIVERY AND STORAGE

A. Costs of all shipping and storage requirements shall be borne by the Contractor unless otherwise directed in writing by the Consultant. The Contractor will make appropriate arrangements and coordinate with authorized personnel at the site for the acceptance, protection and storage of the delivered equipment. Unless specific arrangements are made the Contractor will be responsible for all equipment delivered to the site until formal acceptance by the Owner.

1.10 SITE REQUIREMENTS

A. The Contractor will clean up the project site on a daily basis. The Contractor will be responsible for the coordination of their work with other trades who are working in the same location on the project site. The Contractor will be responsible for repairing any damage caused to the premises by the Contractor's installation activities.

1.11 OWNER TRAINING

A. The Contractor will provide training by a qualified instructor to personnel designated by the Owner. In the event the Contractor does not have an instructor on staff, a Manufacturer's representative will be provided by the Contractor at no additional cost to provide the training.

B. All training shall take place after the system acceptance tests and the systems are operational.

C. The training will be divided into three (3) sessions of two (2) hours each and this training is to be done with the Owner's designated representatives. The Contractor will provide the schedule for training and a sign in sheet.

D. One (1) technical training session of three (3) hours shall be provided to the Owner's designated representatives

E. Should the Owner request additional training; the Contractor will make the appropriate arrangements and provide to the Owner the costs for this training.

F. All training materials and the training plan shall be reviewed and approved by the Owner prior to training sessions.

1.11 PUBLICATION

A. No information relative to this job may be released for publication without prior written approval from the Owner, Architect and the Consultant.

1.12 INSURANCE

A. The Contractor shall procure and maintain the required comprehensive liability and property damage insurance as required by the General Contractor for the duration of this project.

PART 2 - PRODUCTS

2.01 AUDIOVISUAL EQUIPMENT

HLPUSD PAC			
Auditorium			
VIDEO			
ITEM	QTY		
12K Projector	1	Panasonic	PT-RX120BL
Lens	1	Panasonic	ET-DLE250
Custom Projector Lift	1	Display Devices	Quote SO56211
135" x 216" Projection Screen	1	Draper	635395
16 X 16 Digital Matrix	1	AMX	DGX1600-ENC
CAT Input Board	2	AMX	DGX-I-DXL-4K60
HDMI Input Board	1	AMX	DGX-I-HDMI-4K 60
CAT Output Board	2	AMX	DGX-O-DXL-4K60
HDMI Output Board	1	AMX	DGX-O-HDMI 4K60
Audio Extract	2	AMX	DGX-AIE
CAT Receiver	4	AMX	DX-RX-4K60
HDMI Décor Transmitter	6	AMX	FG1010-330-BL
55" Display	3	Panasonic	TH-55CQ1U
1 X 4 HDMI Distribution Amplifier	2	Extron	TBD
75 Foot Active HDMI Cable	1	Extron	26-727-75
50 Foot Active HDMI Cable	1	Extron	26-727-50
25 Foot Active HDMI Cable	1	Extron	26-727-25
Video Recorder	1	Blackmagic	Hyper Deck Studio HD +
Web Presenter 4K	1	Blackmagic	Web Presenter 4K
HDMI to SDI Converter 12G	1	Blackmagic	HDMI to SDI 12G
SDI to HDMI Converter	1	Blackmagic	SDI to HDMI 12G
22" Monitor	2	Samsung	TBD
Rack Mount Dual Monitor	2	Marshall	ML-702
BluRay DVD Player	2	Sony	Sony UBP-X700
Camera	1	Marshall	CV620-BK4

AUDIO			
Stage Monitors	2	Peavey	TBD
Speaker System	1	Biamp Quote	QUO-47510-F5H7
Ceiling Speakers	24	Atlas	FAP63T
Pendant Ceiling Speakers	0	Atlas	PM8GD-B
FOH Monitor Speakers	2	Yamaha	HS5
Bluetooth Receiver	2	Denon	DN-200BR
DSP	1	Biamp	Tesira AVB AI
Expander Frame	1	Biamp	EX-MOD
4-Ch Output Board	2	Biamp	EOC-04
AEC Input Board	1	Biamp	EEC-4
4-Ch Input Board	0	Biamp	EIC-4
Microphone Splitter	4	Jensen	pv 12M
Audio Console	1	A & H	QU 32
Digital Snake	1	A & H	AR-2412
Digital Snake Expander	1	A & H	AR-84
Belt Pack	6	ClearCom	RS 701
Headset/Microphone	8	ClearCom	CC 300 X4
Wall Station	4	ClearCom	KB-702GM
Rack Mount Main Station	1	ClearCom	MS-702
Station Microphone	3	ClearCom	GM-9
Rack mount Remote Station	2	ClearCom	RM-702
2 x 200 Watts Amplifier	1	Lab gruppen	E4:2
4 X 100 Watts Amplifier	1	Extron	XPA U 1004-70V
Wall Mounted Speaker Volume Ctl.	2	Atlas	15W
AT4041 Microphone Pair	1	Audio-Technica	AT4041SP
Drum Kit Microphones	1	Shure	PGDMK6XLR
Microphone	8	Shure	SM-58
Wireless Mic	2	Shure	ULXS
Microphone Cables 25 ft.	30	Mogami	TBD
Rack Mount Speaker/Amplifier	1	Recortec	RSS-125 1U
Audio Snake 50 ft.	2	Elite Core	PS 8x4-50
Hanging Microphones	6	Audio-Technica	U853RW

OTHER			
7" Touch Panel	1	AMX	MD-702
10" Touch Panel	1	AMX	MT-1002
7" Panel Rack Mount	1	AMX	MXK-RMK-07
IP/RS-232 I/F	2	AMX	EXB-COM2
IP/RLY I/F	1	AMX	EXB-REL8
Ipad	1	Apple	10th Generation
AV Equipment Rack	1	Middle Atlantic	ERK-4425-AV
Seismic Brackets	1	Middle Atlantic	ERK-Z4
Cable Ladder Standoff Kit	2	Lowell	CLH-SK46
Cable Ladder	1	Lowell	CL-1210
16U Wall Rack w/Zero Clearance Latch	1	Middle Atlantic	DWR 16-17
Zero Clearance Latch	1	Middle Atlantic	DWRSR-ZL
Vertical Power	1	Middle Atlantic	PD-815SC
7U Wall Rack	1	Lowell	LWER-718
Stage Front Floor Box	3	FSR	FL-200-4
Box Cover Black	3	FSR	FL-200-PTBLK
Plates and Panels	1	Panel Crafter	Quote
Microphone Stands	14	K & M	KM210/9B
Table Top Microphone Stands	6	Atlas	DS7E

2.02 ASSISTED LISTENING SYSTEM

HLPUSD PAC			
Assisted Listening			
AUDIO			
Dual FM with Wi-Fi System	1	Williams	FM 557 PRO
FM Receiver	10	Williams	PPA R36N
Surround Headphone	10	Williams	EAR 022
Neck Loop Lanyard	2	Williams	NKL 001
Charging Tray	1	Williams	CHG 3512
Batteries (2-1.2V AA Rechargable	10	Williams	Bat 026-2
Antenna	1	Williams	ANT 024

PART 3 - EXECUTION

3.01 GENERAL

A. General

1. Installation practices shall be in accordance with, but not limited to, the specifications and drawings and shall be performed in accordance with the applicable standards, requirements and recommendations including those of the National, State and Local authorities having jurisdiction.

2. Any variation of the above requires a written request for modification submitted through the proper channels, and the changes will not commence without receiving written approval.

B. Physical Installation

1. All equipment shall be secured in place unless requirements of portability dictate otherwise.

2. Fastenings and supports of the equipment shall be adequate to support their loads with a safety factor of at least three. All boxes, equipment, etc., shall be secured plumb and square.

3. Aesthetic factors should be considered for the installation of all equipment, racks, projectors and other visible items to ensure a pleasant appearance. If in doubt, a request should be made, in writing, through the proper channels to verify the items in question before installation.

C. The Contractor shall provide all options, accessories and hardware necessary to meet the function of the design even if they are not specifically listed (e.g., rack mount kits, separate or additional power supplies, blank or vented rack filler panels, input modules, transformers, etc.).

D. Trim Components

1. All trim components should match where applicable to the furniture, ceiling and walls. The Contractor should obtain a sample if required by the Architect or Consultant.

E. Device Plates

1. NEMA gang type plates shall be standard or jumbo size as required at each plate position.

2. Plates larger than NEMA 2-gang type plates shall be 1/8” aluminum or 1/16” stainless steel.

3. All plates shall be sized to cover the mounting box and rough opening.

4. All text and graphics shall be engraved.

a. Use 1/8” letters with contrasting fill.

5. Finish shall be black and be approved by Architect.

6. Connectors shall be fixed to plates and panels using screws and nuts, or by using the mounting method integral to the connector. Rivets are not acceptable.

7. Detailed drawings of plates and panels showing information required shall be submitted prior to fabrication. No exceptions.

8. Provide blank plates with approved finish for ALL AV systems wall, floor and ceiling boxes that do not have receptacles.

9. At all non connectorized pass-through's, provide a secured grommet in ceiling, wall or plate.

F. Cable Installation

1. Wire bundles will adhere to industry standards and be neat and free of cable twists or crossovers.

2. Cables will be marked with a permanent, printer generated cable marker at each end, which corresponds to information shown on drawings.

3. Cables will be grouped according to the signal levels. Separate groups will be formed for the following signal types:

    a. Low level audio

    b. High level audio

    c. Loudspeaker cables

    d. Control cables

    e. Video cables

    f. Data cables

4. No splices are permitted without the approval of the Consultant.

G. Equipment Rack Wiring

1. Power, control and high-level cables should be run on one side of the equipment rack and all other cables run on the opposite side of the equipment rack.

2. All cables should be tied or laced as required.

3. Use of a wire management system or rack frame is required for all vertical cable bundles.

4. Teflon or heat-shrink tubing shall be used to insulate the ground or drain wire.

5. Connections made with screw actuated pressure type terminal strips shall be made following the connector manufacturer's recommendations.

6. All cable entry will be through the tops or base of the rack.

7. Approved wire and cable types:

a.	RF (Horizontal)	Submit type
b.	RF (Vertical)	Submit type
c.	RGBHV	Extron MHR5
d.	Video Digital and Analog	Belden 1505A
e.	Digital Audio	Belden 1800B
f.	Analog Audio	Belden 8451
g.	Speaker	Oxygen Free
h.	Control	Submit type

i.	CAT 5e	Belden Brilliance
j.	CAT 6	Submit type
k.	CAT 6a	For HDBT

8. The above list is for non-plenum cable. If plenum cable is required, use the equivalent plenum version of the above listed cable types.

9. Cables running in plenum areas without conduit shall be plenum rated cable. It is the responsibility of the Contractor to inspect the required drawings and verify plenum cable requirements.

10. All cable installation must comply with the bend radius requirements recommended by the cable manufacturer.

11. Consultant must approve the substitution of other cable types and manufacturers.

H. Grounding Procedures

1. Primary Ground

a. A single primary ground shall be established for the systems in the project. Ground conductors from each system will connect to this primary system ground.

b. A system ground will be provided in each equipment rack and shall consist of a copper buss bar large enough to accommodate all ground conductors.

2. Video Connectors

a. All BNC connectors will be insulated from the mounting panel.

3. Audio Connectors

a. All bushing type audio connectors will be insulated from the mounting panel.

4. Audio Cable Shields

a. All audio cable shields shall be grounded at one end only except microphones cables, where the shield shall be connected at both ends but grounded at the patch panel or equipment input only.

b. It shall be the responsibility of the Contractor to follow good engineering practices in the grounding of the system. Any deviations to the above must be approved by the Consultant prior to implementation.

3.02 CONTRACTOR SYSTEM CHECKOUT

A. Contractor will show by proof of performance test that the system is equal to or better than the equipment specifications listed herein. The proof shall be by actual tests.

B. During performance testing, all equipment shall be operated as would be expected under normal system operation conditions. All results will be documented in spreadsheet form.

C. Signal Paths

1. Test all switch cross points and pathways and document the results.

D. Video (Composite, Component, HDMI, DVI, Display Port, SDI, MPEG, VGA)

1. Test and verify all video signal paths from every source to every destination and document the result.
2. Utilize a signal generator capable of outputting the appropriate signal type(s) required for the system and view the image quality.
3. Test, measure and adjust equipment as needed to meet industry standards for displaying such signal types and document the results.
4. Check that the image is correctly displayed on the monitor(s).

E. RGB, RGBHV

1. Test and verify all RGB and RGBHV signal paths from every source to every destination and document the results.
2. Utilize a signal generator capable of outputting the appropriate signal type(s) required for the system and view the image quality.
3. Check that the image is correctly displayed on all monitor(s).
4. Utilize the required test patterns and adjust transmission quality for each source and destination.

F. Optical

1. Video display units shall be solidly mounted and braced. No vibration or movement of the image shall be observed.
2. The total averaged light output from a video display, in lumens, shall be within plus-or-minus 15.0% of that specified by the projector manufacturer.
3. The light fall-off from the center of the projected image to all four corners, as measured at the projected image plane, shall not exceed 45% for display images. The light intensity shall be measured at all five positions of the projected image.

G. Audio

1. Test and verify all audio paths from every source to every destination and document the results.
2. Connect the output of the appropriate audio signal generator to each device input, test for a clean signal path to each output, and document the results.
3. Monitor systems and signals and verify that the systems are free from audible noise and hum.
4. Unless specified otherwise, by the equipment manufacturer, all electronic equipment shall be 20Hz to 20 kHz, ± 1.0 db.
5. Provide DSP programming for review by the consultant.
6. Verify that systems operate in accordance with the design intent provided by the consultant.

H. Control System

1. Test that all equipment to be controlled responds to the commands issued by the control system.
2. Test every controller for proper operation.

3. Verify that the control keypads, remotes and touch screen panel layouts match the layout agreed to by the Consultant.

4. Verify that the control keypads, remotes and touch screen panel functionality match the functionality requirements as provided by the Consultant.

I. At the conclusion of the tests, calibrate the system.

J. Establish and mark settings for all controls and mark accordingly. These settings will be included in the As-Built drawings.

K. Provide one set of As-Built drawings, manuals and other documentation to the Consultant for approval.

3.03 SYSTEM ACCEPTANCE TESTING

A. The Contractor will furnish all test equipment to perform all tests recommended by the manufacturers and required by the Consultant during commissioning.

B. The integrated system as shown on the drawings must be tested and commissioned as a fully functional system.

C. The Owner or its designated representative may perform or have any tests performed that the Owner requests to verify the testing of the system.

D. The Contractor shall provide a complete test plan to the Project Manager seven days prior to the proposed test date, specifying capabilities and functions to be tested. All test results shall be forwarded to the Project Manager upon completion.

E. Each component will be tested per the manufacturer's recommended tests, to ensure equipment is functioning properly.

F. The Owner may have representation at all testing.

G. A physical inventory will be taken of all equipment on site and will be compared to an equipment list included in the contract documents and as invoiced by the Contractor.

H. The Contractor will demonstrate the operation of the system and all equipment.

1. Final As-Built drawings and manuals will be available at this time.

2. Manufacturers' catalog sheets and specifications for all equipment.

3. Operating manuals for all equipment

4. Source code for all equipment that requires programming

5. Test reports for the entire system

6. All test results will be submitted in hard paper copy and electronic file form

I. Complete sets of these documents delivered to the Consultant.

J. If further adjustment is required or defective equipment is discovered, testing may be suspended and rescheduled at the option of the Consultant.

K. The Consultant may charge for additional time required by the Consultant and/or others to over-see the system repair and testing due to improper system installation or incorrect operation of the system. The costs shall be the responsibility of the Contractor.

L. All training sessions with Owner's staff and training media shall be completed.

M. As-built Drawings shall include cable pathways, device locations with correct labeling and locations. The as-built drawings shall be prepared using AutoCAD V. 2012 or later. Provide the Owner with electronic versions of all documentation and as-built drawings on appropriate digital medium.

N. Consultant and Contractor Recognition

1. The installation will bear the following identification plate mounted at the top of the agreed to equipment rack:

SYSTEMS DESIGNED BY:

HJSA Consulting LLC

AURORA, CO. 80015

303-583-6582

SYSTEMS INSTALLED BY:

CONTRACTOR

CITY, STATE ZIP

CONTACT PHONE

3.04 ON-SITE ASSISTANCE

A. Occupancy Adjustments: When requested by owner within one year of date of substantial completion, provide on-site assistance in tuning and adjusting the system to suit actual occupied conditions and to optimize performance.

END OF SECTION 274100

SECTION 27 5500

ASSISTIVE LISTENING SYSTEM

(DISTRICT FURNISHED, CONTRACTOR INSTALLED)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Requirements including but not limited to:

1. Assistive listening system, including transmitters and receivers.
2. Equipment rack.
3. Accessories required for a complete and functional system.

1.02 SYSTEM DESCRIPTION

A. Assistive Listening System (District Furnished, Contractor Installed): System capable of broadcasting on 57 channels at 216MHz.

1. Channel Tuning Operation: Push button (Up or Down) operation button with locking capabilities after setting to transmitting channel.

2. Receiver and Transmitter: Digital tuning to prevent drifting due to environmental conditions.
   a. Transmitting Channel: Front panel display on receivers and transmitter.
   b. Receiver: LCD display indicating battery status, RF signal strength, and channel.
   c. Receiver Sensitivity: 0.6 microvolt typical and 1 microvolt maximum at 12dB SINAD.
   d. Incorporate receiver with stereo headset jack allowing user to plug into a mono or stereo headset.
   e. Receiver Headset Amplifier: Minimum 750 MV RMS at 25KHz deviation into a 32 ohm load.
   f. Incorporate automatic battery charging circuitry into receiver for recharging of nickel hydride batteries.

B. FM Receivers (District Furnished, Contractor Installed): Programmable receiver capable of receiving on 57 wide and narrow band channels and capable of electronically locking out unneeded channels.

1. Frequency Response: Within 3dB from 30Hz to 17KHz.

2. Number of Receivers: Equivalent to 4% of seating capacity but not less than two.

3. Features:
   a. Channel seeking.
   b. Adjustable squelch.
   c. LCD display indicating channel, battery level, low battery, battery charging, and RF signal strength.

C. Transmitter (District Furnished, Contractor Installed): Portable FM transmitter capable of broadcasting on 57 channels with integrated antenna using microphone cable as an antenna.

1. Capable of broadcasting on both wide and narrow band channels.

2. Audio Frequency Response: Within 3dB from 50Hz to 15KHz.

3. Mechanically locking battery door.

4. Features:
   a. Mute switch.
   b. LCD display.

D. Take necessary precautions to prevent electromagnetic and electrostatic hum.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Accessibility Requirements:
   a. Applicable requirements for the American Disabilities Act Accessibility Guidelines (ADAAG) for Buildings and Facilities, including updates and revisions.
   c. Comply with CCR, Title 24, Part 2, California Accessibility Regulations, 1998 California Building Code.
      1) Assistive Listening System shall conform to Section 1104B.2.

2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Installers Qualifications: Experienced installer having minimum 5 years documented experience in the installation and maintenance of and commercial sound systems.

C. Sole Source Responsibility: Provide assistive listening system by a single manufacturer…

1.04 SUBMITTALS

A. Wiring Diagrams: Detailed wiring for power and control systems and differentiate between manufacturer installed/provided and field installed wiring and between components provided by operable panel partition manufacturer and those provided by others.

D. Materials List: Complete listing of major components required for complete and fully functional *installation* of Sound System including Manufacturer, Model number, and short description of each item.

1.05 WARRANTY

A. For any materials required for installation of Owner Furnished Equipment, provide written warranty executed by Manufacturer, Contractor, and Installer of assistive listening system, agreeing to promptly replace or repair defective materials and workmanship as required to maintain system, including labor and materials.

1.06 MAINTENANCE SERVICE

A. Maintenance: Beginning at Substantial Completion, provide 12 months on site full maintenance by skilled employees of the system installer.

1. Services Included: Adjusting sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions.

2. Provide quarterly preventive maintenance, repair or replacement of worn or defective components, cleaning, and adjusting as required. Provide parts and supplies used in manufacture and installation of original equipment.

B. Submit proposal for service and maintenance of assistive listening equipment for life of equipment commencing from Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Manufacturers: Drawings and specifications are based on products of Daktronics.

B. Components (District Furnished, Contractor Installed):

1. Assistive Listening System: Daktronics, Model A-2016.
   a. Includes transmitter, recievers, earphones, neck loops/lanyards, USB charger, universal antenna, and signage kit – 216 Mhz

2. District to provide adequate receivers to support 4% of total occupant load in Bleachers.

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine conditions for compliance with requirements for installation tolerances and conditions affecting installation and performance. Proceed with installation after unsatisfactory conditions have been corrected.

B. Coordinate work of related trades. Ensure materials for connections and installation are in place and ready to accept system installation activities.

3.02 INSTALLATION

A. Provide materials, devices, components, and equipment for complete, operational systems. Install system in accordance with manufacturer's instructions.

B. Cabling Locations:

1. Above Ceiling: Tie off cabling and support using ceiling supports or structures minimum 18 inches above ceiling. Cabling is not permitted to lay directly on ceiling.
   a. Where site conditions do not allow installation of cabling as specified, notify Construction Manager prior to installation.
   b. Exposed cabling is not permitted except in above ceiling areas.

C. Install mounted equipment with black number 10 button head machine screws with Alien drive. Mount equipment and enclosures plumb and level.

D. Cabling and Wiring: Take precaution to prevent and guard against electromagnetic and electrostatic hum.

1. Prevent and guard against RFI from nearby sources.

2. Damaged cables or wire is not permitted. Isolate cables and wires of different signals or different levels. Separate, organize, or route to restrict channel crosstalk and feedback oscillation in amplifier section. Keep cabling and wiring separated into groups.

3. Make joints and connections with rosin core solder or with mechanical connectors approved by Construction Manager; where spade lugs are used, crimp properly with ratchet type tool.

4. Cover edges of cable and wire pass through holes in chassis, housings, boxes, with rubber grommets or Brady GRNY nylon grommetting.

5. Provide splice fee wiring and cabling from origination to destination.

E. Cable Housing:

1. Connect cabling and wiring entering equipment housings via connector termination or terminal block,

2. Install terminal block fully exposed, labelled, and mounted on ¾ inch plywood board painted flat black with fire retarding paint.

3. Install cable and wire in neatly tied manageable bundles with cable lengths cut to minimize excess cable slack but allowing for service and testing. Label each cable. Provide horizontal support bars if cable bundles sag.

4. Neatly bundle excess AC power cable from housing mounted equipment with plastic cable ties.

5. Provide plastic cable ties or lacing twine to bundle cabling and wiring. Electrical tape and adhesive backed cable tie anchors are not acceptable.

6. Provide 3 conductor, isolated ground, 120 VAC outlets when required within each housing plus two spare outlets.

7. Provide termination resistors of 5 per cent tolerance; fully visible and not concealed within equipment or connectors.

8. Install with connections completely visible and labelled.

9. Coordinate final connection of power and ground wiring to housings. Hardwire power wiring directly to power contractors or internal AC receptacles to ensure uninterrupted operation.

10. Provide copper ground bus top to bottom in each housing, insulated from housing. Ground equipment chassis not having a three wire power cord to these busses using 6/32 nuts, bolts and lock washers with No. 12 wire. Connect green ground wire from each AC outlet in housing to this buss bar.

3.03 FIELD QUALITY CONTROL

A. Prior to System Energization or Testing:

1. Ensure insulation and shrink tubing are present where required.

2. Remove dust, debris, solder, and splatter.

3. Verify cable is dressed, routed, and labelled; and polarity of connections is consistent.

4. Each wire and cable is labelled.

5. Each component is clean, unmarred, and securely attached.

6. Electronic devices are appropriately grounded.

B. Prior to energising system, conduct preliminary testing in compliance with applicable EIA standards. Record the results of each test in the Project Record Manual.

1. Test each AC power receptacle with a circuit checker for proper hot, neutral and ground connections.

2. Measure and record DC resistance between technical ground in equipment rack or console and main building ground. Resistance: 0.1 5 ohms or less.

3. Temporarily lift technical ground from main electrical ground, measure and record DC resistance between the grounds. Resistance: l000 ohms or greater.

C. System Acceptance Tests: Perform testing upon completion of system checkout. System acceptance tests shall be supervised by District Representative and Construction Manager.

1. Take physical inventory of equipment and components and compare with equipment lists.

2. Perform subjective and objective tests required by District Representative and Construction Manager to determine compliance with specifications. Provide test equipment necessary for testing.

3.04 DEMONSTRATION AND TRAINING

A. Training Requirements: Provide system documentation to School District Owner prior to system training.

1. Practical and comprehensive operation of system.

2. Basic system troubleshooting techniques.

3. Videotape of each type of training session provided.

B. Maintenance Training: Provide minimum 4 hours of service training for maintenance personnel. Schedule training into sessions that best facilitates delivery of information. Include in training session:

1. Basic system configuration and operation knowledge.

2. Advance system configuration and operation knowledge.

3. Typical user troubleshooting skills.

4. Basic system troubleshooting skills.

C. Instruction of School District Personnel: Arrange with School District and School Principal for demonstration and instruction of personnel in the use and maintenance of assistive listening system and devices.

1. Develop instructional course based on the use of the system and manufacturer's recommendations. Provide minimum 8 instructions. Schedule training into sessions that best facilitates delivery of information.
   a. Provide each group of users with minimum training hours.
   b. Training time is defined as hours specifically set aside for purpose of training school personnel. Credit will not be given for time spent providing instructions to school personnel on system that has not passed final acceptance by the Construction Manager and the School District. Credit will not be given for training performed outside of the approved training plan.

c. Coordinate training with School District and District's system integrator.
d. Training sessions are for staff development and the typical user (teachers, administrators and operators).

D. The Owner reserves the right to establish training times and duration.

END OF SECTION

Division 27 Appendix B

Biamp Quote QUO-47510-F5H7

9300 SW Gemini Drive
Beaverton, OR 97008
United States

Tel +1 503 641 7287
Fax +1 503-626-0281
biamp.com

Quotation

To:

HJSA Consulting
5753 S. Rome Street
Aurora, CO - US, 80015
United States

Contact Info:

Doug Schoenherr - Consultant Liaison
Doug.Schoenherr@biamp.com
-

Quote Name: Hacienda La Puente USD Temple Academy Performing Arts Center, La Puente, CA

Opportunity Name: Hacienda La Puente USD Temple Academy Performing Arts Center, La Puente, CA

Summary:

Quote ID:	**QUO-47510-F5H7**
Created On:	19/Jun/23
Expires On:	31/Dec/23
Opportunity ID:	PRJ059491
Promo Code(s):	
Total:	**$78,628.00**

Design Quote with Sub Enhancement

Details

Product	Product ID	Description	Quantity	Unit Price	Sub-Total
IV6-1122/05B		12-inch two-way, 120 x 05 (Indoor, Black)	4	$4,400.00	$17,600.00
IV6-1122/15B		12-inch two-way, 120 x 15 (Indoor, Black)	8	$4,400.00	$35,200.00
IV6-GP-AF		IV6 Glidepoint™ array frame (Black)	2	$2,862.00	$5,724.00
IV6-S1		Splay bracket pair Type 1 (Black)	3	$172.00	$516.00
IV6-S2		Splay bracket pair Type 2 (Black)	5	$172.00	$860.00
IV6-S3		Splay bracket pair Type 3 (Black)	2	$172.00	$344.00
PY1-EN750-1550		Lift point for array frames (Black)	2	$210.00	$420.00
ALC-1604D		Amplified Loudspeaker Controller - 4 Channels X 1600W + DSP Dante	1	$5,700.00	$5,700.00
ALC-3202D		Amplified Loudspeaker Controller - 2 Channels X 3200W + DSP Dante	1	$5,000.00	$5,000.00
IV6-118SB		18-inch subwoofer (Indoor, Black)	2	$3,632.00	$7,264.00
		System Sub-Total:	**30**		**$78,628.00**

Total: **$78,628.00** **MSRP**

Pricing is US Dollar. Unless indicated, freight charges and any applicable duties or taxes have not been included. This quotation or the quote number must accompany the purchase order and is valid for 195 days. Please send your purchase order to orders@biamp.com. See https://www.biamp.com/legal/warranty-information for details on the warranty. Payment terms are based on customer's current payment term arrangements with Biamp at time of order. This quotation is in accordance with Biamp's Terms and Conditions of Sales available at www.biamp.com/sales-terms-and-conditions.

SECTION 28 1300
ACCESS CONTROL SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Head-End Equipment and Components

B. Software

C. Door Controllers

D. Door Devices

E. Door Operation

F. Infrastructure

G. Raceway and Boxes

H. Audio Intercom

1.2 RELATED DOCUMENTS

A. Drawings, General and Special Conditions, and other Technical Specifications that apply to work of this section.

1.3 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 General Requirements, apply to this section.

B. Division 08: Openings

C. Division 26: Electrical

D. Division 27: Communications

E. Division 28: Electronic Safety and Security

1.4 REFERENCE STANDARDS

A. Materials and workmanship shall conform to the latest issue of all industry standards, publications or regulations referenced in this section and with the following references, as applicable.

1. Local Building Code
2. Local Electrical Code
3. NEC - National Electrical Code
4. UL – Underwriters Laboratories
5. ANSI – American National Standards Institute
6. NFPA – National Fire Protection Association

7. IEEE – Institute of Electrical and Electronics Engineers
8. TIA – Telecommunications Industry Association
9. EIA – Electronic Industries Alliance

B. If the requirements of these specifications or the Project Governing Drawings exceed those of the governing codes, regulations, and manufacturer installation requirements, then the requirements of these specifications and the drawings shall govern. However, nothing in the drawings or specifications shall be construed to permit work not conforming to all governing codes, regulations and manufacturer installation requirements.

1.5 SUMMARY

A. This section includes the Access Control System (ACS) as shown on the drawings. The work under this section consists of furnishing materials and equipment, performing labor and services necessary for the installation of the ACS as required for the Security System.

B. The intent of this project is for the Access Control System (ACS), Intrusion Detection System (IDS), Intercom, and Video Surveillance System (VSS) Sections be provided by a single Security Contractor (SC); if not in actuality, then contractors and sub-contractors shall function as a single SC. All materials and interfaces necessary shall be provided by the SC and sub-contractors to perform the features, functions and operating procedures required. This includes hardware, firmware and software, at no additional cost to the Owner. SC to coordinate with GC on door preparation for security devices

C. The door hardware provider (Section 08) shall provide the proper and code compliant security door hardware. Connections to electronic locking mechanisms and all other devices connections will be made available in accessible locations by the hardware provider for use by the SC. Connections of the power supplies to the ACS and to the socketed door hardware equipment shall be by the SC. All doors controlled by the ACS will have, at minimum, a door position switch (DPS) and request-to-exit (REX) unless otherwise noted on the drawings. On double-leaf doors: Both sides shall have integrated REX hardware and both sides will have door position switches (DPS) such that the ACS will treat both doors as a single opening.

D. Pricing shall disclose all software and maintenance costs, including on-going and/or annual requirements and “seat-based” costs for the consideration of the Consultant and selection by Owner. Features and functions specified herein shall be considered base bid and costs included unless otherwise stated by Vendor in proposal. Undisclosed costs or adders will not be allowed.

1.6 SYSTEM DESCRIPTION

A. System control at the central computer location shall be under a single software program control, shall provide full integration of all components, and shall be alterable at any time, depending upon the facility requirements. Reconfiguration shall be accomplished through system programming, without hardware changes.

B. The ACS shall employ an open architecture, allowing communication between products from other approved manufacturers, as necessary.

C. Access control functions shall include validation based on time of day, day of week, holiday scheduling, automatic or manual retrieval of cardholder photographs, and access validation based on positive verification of card.

D. Utilizing assigned passwords and user groups, it shall be possible to define the levels of system operation for each individual user. User actions range from basic monitoring to full administrative control of the system database.

E. The ACS, VSS, and IDS shall be an integrated system. The VSS shall provide monitor call up of cameras in the area of an alarm initiated by the ACS or IDS. Card reader activity will also bring up card holder information and ID picture on ACS client screens.

F. The installation shall be a dispersed system utilizing door controllers installed at the doors with no central panel requiring hard wired connections from door devices. All door controllers shall report to the system via Ethernet connection over CAT6 cable.

G. After installation, through training by SC, the Owner shall be able to perform administrative changes, as desired, without the services of the manufacturer or SC.

H. Equipment repair shall be able to be accomplished on site, by module replacement, utilizing spare components.

I. The system shall communicate utilizing the LAN/WAN connections and shall not require a dedicated security Ethernet network for controller/client communications.

J. Local, on-site monitoring and control shall be made available via client software on SC provided computer workstations on the LAN, as shown.

K. The SC is responsible for coordinating with the IT department on network connectivity. The SC shall not access the LAN/WAN or make any modifications without written authorization from the owner.

L. SC to coordinate with GC to provide compliant connections and interactions with the site fire alarm system, as required by local and NFPA code.

M. All exterior access-controlled doors shall fail secure in the event of a catastrophic power failure. Doors shall allow free egress but restricted ingress. Exterior doors shall be keyed to allow ingress. Door hardware and lock hardware provided by GC.

N. The SC shall furnish and provide back-up battery power to the ACS panels and lock hardware so that the system remains fully operational for a minimum of three (3) hours after loss of main power.

O. The SC shall ensure that the ACS server is on either a site UPS or a SC supplied UPS.

P. The Audio Intercom shall consist of simple door stations at the kitchen receiving door and main entry vestibule door, with master stations in the kitchen office and the reception desk. The door release in the master stations shall be connected to the ACS which in turn will release the doors. Calls from the kitchen receiving door should ring the kitchen office master station first, and then roll-over to the reception desk master station.

1.7 INTENT OF DRAWINGS

A. The drawings are diagrammatic unless detailed dimensions are included. Drawings show close approximate locations of equipment and devices. Exact locations are subject to the approval of Owner and Owner's representative.

B. Anything mentioned in the specifications and not shown in the drawings or shown in the drawings and not mentioned in the specifications, shall be of like effect as if shown and mentioned in both. In case of differences between the specifications and drawings, the stricter provision, as determined by the project coordinator, shall govern. Omissions from the drawings or specifications, or the incorrect description of details of work which are evidently necessary to

carry out the intent of the drawings and specifications, shall not relieve the contractor from performing such work.

1.8 SUBMITTALS

A. Pre-approval of systems and products for bid proposal and permit:

1. Provide data for each type of product indicated. Data shall include marked-up catalog and specification sheets.
2. Provide system descriptions and manufacturer contact data.
3. Provide system and sub-system one-line drawings, point-to-point diagrams, door elevation drawings with connections, door schedule, sequence of operations, bill of materials and simplified operating features and functions.
4. Provide line item pricing to include; manufacturer, model number/part number, unit price and extended price. Provide break out of all labor costs and detail all miscellaneous costs to include tax and permits.

B. Post-construction documentation:

1. Provide detailed as-built drawings, including locations for all security devices, wiring diagrams and door details.
2. Provide data sheets for each type of product installed.
3. Provide programmed sequence of operation for each type of door.
4. Provide three (3) complete O&M manuals with detailed system operation.
5. Provide warranty information for all installed products.

1.9 QUALITY ASSURANCE

A. All equipment rooms shall be installed in a neat and workmanlike manner.

B. Equipment and materials shall be the current production and quality of the manufacturers indicated.

C. Where "approved equal" or “approved alternate” is stated, the equipment shall be equivalent in every way to that of the equipment specified, subject to approval by the Owner.

D. The design, specifications and drawings reflect an engineered, integrated system. Details of any variances, whether betterments or shortcomings, to the specifications shall be fully disclosed and the Consultant must indicate acceptance prior to bid proposals being considered valid. Mitigation for shortcomings, in the judgment of the Consultant, will be required prior to acceptance of any variances. If a variance has not been approved, the Integrator must remove the shortcoming and provide the specified feature or function.

1.10 QUALIFICATIONS

A. Installer Qualifications:

1. The ACS Installer shall meet all applicable regulations. The Contractor shall be a firm normally employed in the ACS or Security industry.
2. The Contractor must be certified by the manufacturer of the products, adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels.
3. The Contractor shall be certified by the manufacturing company in all aspects of design, installation and testing of the products described herein. Each Contractor shall furnish

with their submittal a letter from the manufacturer indicating they are a dealer in good standing.

4. The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of the specified systems and have personnel who are adequately trained in the use of such tools and equipment.
5. A resume of qualifications shall be submitted with the Contractor's proposal indicating the following:
    a. A list of three (3) recently completed projects using the product proposed of similar type and size with contact names and telephone numbers for each.
    b. A technical resume of experience for the Contractor's Project Manager and on-site Installation Supervisor who shall be assigned to this project.
    c. A list of technical product training attended by the Contractor's personnel that shall install the ACS shall be submitted.

1.11 WARRANTY AND SERVICE AGREEMENT

A. All equipment, materials and labor shall be guaranteed for a period of twenty-four (24) months from the date of final acceptance by the Owner.

B. Provide copies of all manufacturer warranties.

C. Provide any software maintenance updates or upgrades at no additional cost to the Owner during the warranty period.

D. Perform two (2) scheduled preventative maintenance site visits during the warranty period.

E. Response Times: Normal business hours shall be 8 AM to 5 PM Monday through Friday. Calls for service before noon shall be responded to on-site before the end of the day. Calls after noon shall be responded to on-site by noon the following business day.

F. Provide extra costs for time outside of normal business hours if the Owner requires emergency service.

G. Submit an all-inclusive Annual Maintenance Agreement cost for the years after manufacturer's warranty through year five (5).

1.12 PROTECTION OF MATERIALS AND EQUIPMENT

A. Materials and equipment shall be protected from damage during shipment, storage at the site and throughout the construction period. No damaged items shall be installed and immediate steps shall be taken to obtain replacement so as not to interrupt construction schedule.

B. Coordinate site storage of materials and equipment with the General Contractor or Owner.

C. If required by the General Contractor, provide a lockable container for material and equipment storage.

1.13 SITE SAFETY AND ACCESS

A. Determine from General Contractor all job site requirements such as site access, parking and material storage areas.

B. All technicians working on the job site must follow all safety rules set by the General Contractor. All technicians must furnish their own safety equipment including, but not limited to, hard hats, safety glasses, proper footwear (confirm if steel toed boots/shoes are required), fall arrest equipment and safety vests. All safety equipment must be in good working order.

C. Attend all safety orientations and meetings as required by General Contractor.

D. Provide to General Contractor an up-to-date MSDS binder listing materials planned for use on the job site that require MSDS information. Provide the number of copies requested.

PART 2 - PRODUCTS

2.1 GENERAL

A. All products provided by Contractor shall be new and unused and shall be of manufacturer's current and standard production.

B. Where two (2) or more equipment items of the same kind are provided, all shall be identical and provided by the same manufacturer.

C. Drawings and specifications indicate major system components, and may not show every component, connector, module or accessory that may be required to support the operation specified. Contractor shall provide all components needed for complete and satisfactory operation.

D. All equipment and materials used shall be standard components, regularly manufactured, regularly utilized in the manufacturer’s system.

E. Product Availability

1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed contract time.
2. Certain products specified may only be available through factory authorized dealers and distributors. Contractor shall verify his ability to procure the products specified prior to submitting a proposal.

2.2 CENTRAL SYSTEM COMPONENTS

A. System Management Software

1. The ACS system management software (SMS) shall provide an intuitive GUI for performing all the necessary administrative and user tasks needed for an operational ACS.
2. The SMS shall be loaded on a dedicated, manufacturer approved server or personal computer, or be cloud-based, and meet the following minimum requirements:
   a. Open architecture system with options for integration
   b. Distributed intelligence, with controllers able to operate independently of each other
   c. Windows 7/10/11 client compatible
   d. Client/server or web client architecture
   e. ID badging software (as an option)
   f. Comprehensive alarm handling software
   g. Dynamic, interactive site map
   h. Unrestricted cardholder capacity

3. Approved Manufacturers:
    a. Lenel-S2
    b. OpenPath
    c. Genea
    d. or pre-approved equal

B. Server Computer

1. If premised-based, there shall be one SC supplied server computer and monitor located on-site as shown on the drawings. This computer shall have one (1) 22-24" monitor.
2. The computer shall meet the SMS Manufacturer's specified minimum requirements.
3. Approved manufacturers:
    a. Dell
    b. HP
    c. Lenovo
    d. or pre-approved equal

C. Client Computers
1. Client Computer
    a. Client computer workstations are to be provided for the Site by the SC with required software pre-loaded.
    b. SC provided workstation shall include one (1) 27" LCD monitor and shall be utilized for monitoring/control of both the VSS and ACS. SC is responsible for installing all necessary components and software required for this function.
    c. Any required client workstations shall meet or exceed the manufacturer's specified requirements for the VSS and SMS.
    d. Acceptable manufacturers:
        1) Dell
        2) HP
        3) Lenovo
        4) Or pre-approved equal

D. Door Controllers

1. The door controllers shall incorporate microprocessor-based, digital technology using high speed processing for maximum reliability.
2. The system shall use distributed intelligence architecture, with controllers able to operate independently of one another.
3. Controllers shall communicate with the SMS via TCP/IP.
4. Multiple controllers in a MDF/IDF may be daisy-chained via serial data communications.
5. Approved Manufacturers:
    a. Mercury Security.
    b. OpenPath

E. Card Readers

1. All card readers shall be of the proximity type.
2. Card readers shall support various card formats from 26 to 37 bits.
    a. Weigand
    b. Smart Card (contactless)
    c. Mag Stripe
3. Approved manufacturers:
    a. HID RP or Signo Series
    b. Or approved equal

F. Request to Exit Motion Sensor (REX)
1. The REX shall be integrated into the lock mechanism.

G. Door Position Switch (DPS)

1. All DPS shall have the ability to be supervised.
2. The preferred DPS for man doors is a flush mounted unit.
3. DPS for bay doors shall be rail mounted. Floor mounted DPS shall not be accepted.
4. Approved Manufacturers:
   a. Sentrol
   b. or pre-approved equal

2.3 SYSTEM CONFIGURATION

A. The head-end shall support one (1) server computer that may optionally be used as a full functioning Client. The system shall have the ability to support a minimum of two (2) remote Client computers with full system functionality.

B. Host Computer to Controller Communication Transmission Methods/Hardware

1. Communications between the computer and the controller shall be:
   a. Ethernet 10/100/1000

2.4 DEVICES AND OPERATION

A. Contractor shall provide all necessary hardware and software interlocks to accomplish the following sequence of operation:

1. ACS - Normal Operation: When an authorized card is presented to a reader the ACS shall unlock the door, allow ingress and record the event. Free egress shall be allowed through all doors part of egress pathways.
2. ACS - Alarm Mode: If the doors are forced open or a conventional key is used, the ACS will record the event as a “Forced Door” alarm. If the door(s) are held open for longer than the programmed interval, the ACS will record the event as a “Door Held Open” alarm. The alarm mode will also apply to all designated non-card access exterior doors for intrusion detection.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation shall be performed by skilled technicians under the direction of experienced supervisors, all of whom shall be properly trained and qualified for this work.

B. GC Security Project Manager may visit the job site and inspect the VSS installation at any time during the project.

C. Penetrations:

1. Attempt to avoid work in finished areas. Holes drilled in finished surfaces shall be patched and repaired so that there is no noticeable defect in the surface.
2. Do not drill any structural beams, columns or walls without the permission of the Architect.
3. Do not modify any UL fire-rated door or frame in any way.
4. Seal conduit penetrations through exterior walls.
5. Fire caulk (where required) the interior and exterior of conduit sleeves after all wiring has been placed and the system has been tested.

3.2 EXAMINATION

A. Examine pathway elements intended for cable. Check raceways, cables trays and other elements for compliance with space allocations, installation tolerances, hazards to cable installation and other conditions affecting installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 COLLABORATION

A. The Integrator shall collaborate with the Owner and technology consultant to plan the precise function and security schema. Further, the authentication levels and assignments, as well as the access control policies and procedures and all other options shall be designed in conjunction with the Owner's needs.

B. The SC shall present the plan for the Owner and Consultant's approval prior to implementation.

3.4 INSTALLATION

A. Outdoor Installation: Comply with ANSI C2, "National Electrical Safety Code."

B. Install surge suppressors where ac-power-operated devices are not protected against voltage transients by integral surge suppressors specified in UL 1449. Install surge suppressors at the devices' power-line terminals.

C. Low-Voltage and COMM/DATA Equipment

1. Install ACS equipment according to manufacturer's recommendations.
2. All electronic equipment/systems utilizing cord, plug or hardwired connectors shall be bonded to the building electrical system ground, building frame or driven ground rod and shall be provided with a multi-stage suppression system.
3. Contractor must properly match ACS equipment to equipment being protected, including wire sizes, operating voltages, currents and number of conductors.
4. Contractor must coordinate with providers of all equipment being protected and provide ACS equipment which meets these specifications.
5. Equipment shall be installed following manufacturer's recommendations and guide-lines in compliance with NEC Articles for grounding and bonding, and NEC Articles for over-current protection.
6. Provide required enclosures (indoor or outdoor) for equipment.

D. Where shown on the plans, or as required by the specifications, ensure that the power source for each system is from the facility UPS units or SC provided UPS.

E. Wiring Method: Cable shall be run in conduit, stubbed up into open ceiling space and then shall route to appropriate telecom room via low-voltage cable tray (where available) or via code compliant free-wire methods where cable tray is not available. Install cables concealed in accessible ceilings, walls and floors where possible. All cabling shall be routed in a clean and efficient manner. There shall be no exposed cable outside of the device.

F. Wiring within Enclosures: Bundle, lace and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

G. Pulling Cable: Do not exceed manufacturer's recommended pulling tensions. Do not install bruised, kinked, scored, deformed or abraded cable. Do not splice cable between termination,

tap or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

H. Exposed Cable: Install parallel to building lines, follow surface contours and support the cable according to manufacturer's written instructions. Do not run adjacent and parallel to power cables.

I. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL486A and UL486B.

J. Grounding: Provide independent signal circuit grounding recommended by manufacturer.

K. Collection Boxes: Provide one (1) 8”x8” collection box for each access controlled door. Locate collection boxes above the corresponding door and always on the secured side of the door. All collection boxes shall be equipped with a tamper switch.

3.5 LABELING

A. Label all cables using approved scheme. Label horizontal cables at the device and equipment chassis within 12” of termination. Affix labels in a visible location. All labels must be machine made and permanently attached. Label access control interface cables on both ends with door number. Label all equipment chassis per approved labeling scheme.

3.6 FIELD QUALITY CONTROL

A. Inspection: Verify that units and controls are properly installed, connected and labeled and that interconnecting wires and terminals are identified.

B. Test Schedule: Schedule tests after pretesting has successfully been completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days notice of test schedule.

C. Operational Tests: Perform operational system tests to verify that system complies with specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

3.7 OPERATIONAL INSTRUCTION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate and maintain ACS equipment.

B. Train Owner's maintenance personnel on procedures and schedules for troubleshooting, servicing and maintaining equipment.

C. Demonstrate methods of determining optimum alignment and adjustment of components and settings for system controls.

D. Schedule training with Owner, through Architect, with at least seven days advance notice.

3.8 ON-SITE ASSISTANCE

A. Occupancy Adjustments: When requested by Owner within one year of date of substantial completion, provide on-site assistance in tuning and adjusting the system to suit actual occupied conditions and to optimize performance. Provide up to two adjustments at project site for this purpose, without additional cost.

END OF SECTION 281300

VIDEO SURVEILLANCE
SECTION 28 23 00

REVISED 07-22-2023

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. System Description

B. Head-End Equipment and Components

C. Peripheral Devices

D. Infrastructure

E. Raceway and Boxes

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 REFERENCE STANDARDS

A. Materials and workmanship shall conform to the latest issue of all industry standards, publications or regulations referenced in this section and with the following references as applicable.

1. Local Building Code
2. Local Electrical Code
3. NEC - National Electrical Code
4. UL – Underwriters Laboratories
5. ANSI – American National Standards Institute
6. NFPA – National Fire Protection Association
7. IEEE – Institute of Electrical and Electronics Engineers
8. TIA – Telecommunications Industry Association
9. EIA – Electronic Industries Alliance
10. NTSC – National Television System Committee

B. If the requirements of these specifications or the Project Governing Drawings exceed those of the governing codes, regulations, and manufacturer installation requirements, then the requirements of these specifications and the drawings shall govern. However, nothing in the drawings or specifications shall be construed to permit work not conforming to all governing codes, regulations and manufacturer installation requirements.

1.4 SUMMARY

A. This section includes the Video Surveillance System (VSS) as shown on the drawings. The work under this section consists of furnishing materials and equipment, performing labor and services necessary for the installation of the VSS, as required for the Security System.

B. The intent of this Project is for the VSS, Access Control System (ACS) and Intrusion Detection System (IDS) Sections to be provided by a single Security Contractor (SC); if not in actuality, then contractors and sub-contractors shall function as a single SC. All materials and interfaces necessary shall be provided by the SC and sub-contractors to perform the features, functions and operating procedures required. This includes hardware, firmware and software, at no additional cost to the Owner. SC to coordinate with GC on door preparation for security devices.

C. Camera coverage is to, at a minimum, meet the views shown on the attached drawings.

D. SYSTEM DESCRIPTION

E. The VSS shall provide the Owner with the ability to digitally record video images and to view live and recorded video.

F. The Site system shall consist of IP PoE cameras terminating at rack mounted switches via CAT-6 Cable and patch panels.

G. All IP cameras shall be controlled and recorded utilizing a rack mounted Network Video Recorder (NVR), located in IT Room

H. Video Management Software (VMS) shall be used to store, manage and view recorded images.

I. The SC is responsible for coordinating with the IT department on network connectivity. The SC shall not access the LAN/WAN or make any modifications without written authorization from IT.

J. Cameras shall be powered via PoE switches. Rack mounted power supplies will also be acceptable if rack space is available and/or wall space is limited.

K. The SC is responsible for furnishing, installing, and terminating all VSS electronic equipment. This equipment includes, but may not be limited to, all devices listed within Part 2 of this Section. The SC shall provide all final programming, testing, and commissioning of the VSS.

L. The Structured Cabling Contractor (SCC) is responsible for furnishing and installing all VSS low-voltage, control, and communications wiring. The project will require coordination between the SC and SCC for low-voltage cabling.

M. The SCC shall provide and pull all CAT-6 cable for cameras.

N. The Electrical Contractor (EC) is responsible for furnishing and installing all conduit, junction boxes and standard back-boxes, as required for both low-voltage power and video wiring of the entire VSS.

O. Detailed VSS operation shall be as defined by the Owner. The SC is responsible for coordinating with the Owner personnel to ensure system programming is per current standards.

P. SC is responsible for coordinating final camera views and operation with Owner personnel.

Q. All VSS components shall be grounded, and surge protected through appropriate means that meet or exceed Electrical Code Standards.

1.5 INTENT OF DRAWINGS

A. The drawings are diagrammatic unless detailed dimensions are included. Drawings show close approximate locations of equipment and devices. Exact locations are subject to the approval of Owner and

Owner's representative.

B. Anything mentioned in the specifications and not shown in the drawings, or shown in the drawings and not mentioned in the specifications, shall be of like effect as if shown and mentioned in both. In case of differences between the specifications and drawings, the stricter provision, as determined by the project coordinator, shall govern. Omissions from the drawings or specifications, or the incorrect description of details of work which are evidently necessary to carry out the intent of the drawings and specifications, shall not relieve the contractor from performing such work.

1.6 SUBMITTALS

A. Pre-approval of systems and products for bid proposal and permit:

1. Provide data for each type of product indicated. Data shall include marked-up catalog and specification sheets.
2. Provide system descriptions and manufacturer contact data.
3. Provide system and sub-system one-line drawings, point-to-point diagrams, bill of materials and simplified operating features and functions.
4. Provide a narrative for the proposed system that details and responds to the specified system narrative herein on a topic by topic, feature by feature comparison.
5. Provide storage calculations use to determine storage requirements based on specifications provided in this section.

B. B. Post-construction documentation:

1. Provide detailed as-built drawings, including locations for all security devices, wiring diagrams and door details.
2. Provide data sheets for each type of product installed.
3. Provide three (3) complete O&M manuals with detailed system operation.
4. Provide warranty information for all installed products.

1.7 QUALITY ASSURANCE

A. All equipment shall equal or exceed the minimum requirements of NEMA, ASME, ANSI and Underwriters Laboratories.

B. All material and equipment furnished shall be new, unused, and free from defects. Equipment shall be clean and free of damage or corrosion and shall be of the best quality obtainable for the purpose intended.

C. Where more than one of any specified items of equipment or material is required, such items shall be the product of one manufacturer throughout the facility unless otherwise specified.

D. All materials used shall bear labels attesting to Underwriters Laboratories approval, provided a standard is established for the material in question.

E. All materials shall conform strictly to the standards and specifications set forth in this document. Unless otherwise specified, all products furnished shall be designed, built and installed in accordance with the latest and best practice of the electrical industry, and shall conform to the standards of the NEMA, ANSI, TIA/EIA, ICEA, IEEE and NEC, and this Specification wherever they apply.

F. Contractor personnel shall be qualified to perform the work and be knowledgeable in the following standards, skills and activities, as applicable:

1. TIA/EIA 568B, 569B, 606A and 607A Standards.
2. Bonding and grounding, where required.
3. Testing conductors for electrical continuity.
4. Testing copper and fiber circuits for performance compliance.
5. Cable terminations for specified connectors and terminations for copper and fiber cables.

G. Contractor personnel will be required to provide and use the proper tools in the performance of each activity. The tools must be in good working order. The Owner reserves the right to review the tool lists and tool maintenance procedures of the Contractor.

1.8 QUALIFICATIONS

A. Installer Qualifications:

1. The VSS Installer shall meet all applicable regulations. The Contractor shall be a firm normally employed in the VSS or Security industry.
2. The Contractor must be certified by the manufacturer of the products, adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels.
3. The Contractor shall be certified by the manufacturing company in all aspects of design, installation and testing of the products described herein. Each Contractor shall furnish with their submittal a letter from the manufacturer indicating they are a dealer in good standing.
4. The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of the specified systems and have personnel who are adequately trained in the use of such tools and equipment.
5. A resume of qualifications shall be submitted with the Contractor's proposal indicating the following:
   a. A list of three (3) recently completed projects using the product proposed of similar type and size with contact names and telephone numbers for each.
   b. A technical resume of experience for the Contractor's Project Manager and on-site Installation Supervisor who shall be assigned to this project.
   c. A list of technical product training attended by the Contractor's personnel that shall install the VSS shall be submitted.

1.9 WARRANTY AND SERVICE AGREEMENT

A. All equipment, materials and labor shall be guaranteed for a period of twenty-four (24) months from the date of final acceptance by the Owner.

B. Provide copies of all manufacturer warranties.

C. Provide any software maintenance updates or upgrades at no additional cost to the Owner during the warranty period.

D. Perform two (2) scheduled preventative maintenance site visits during the warranty period.

E. Response Times: Normal business hours shall be 8 AM to 5 PM Monday through Friday. Calls for service before noon shall be responded to on-site before the end of the day. Calls after noon shall be responded to on-site by noon the following business day.

F. Provide extra costs for time outside of normal business hours if the Owner requires emergency service.

G. Submit an all-inclusive Annual Maintenance Agreement cost for the years after manufacturer's warranty through year five (5).

1.10 PROTECTION OF MATERIALS AND EQUIPMENT

A. Materials and equipment shall be protected from damage during shipment, storage at the site and throughout the construction period. No damaged items shall be installed and immediate steps shall be taken to obtain replacement so as not to interrupt construction schedule.

B. Coordinate site storage of materials and equipment with the General Contractor or Owner.

C. If required by the General Contractor, provide a lockable container for material and equipment storage.

1.11 SITE SAFETY AND ACCESS

A. Determine from General Contractor all job site requirements such as site access, parking and material storage areas.

B. All technicians working on the job site must follow all safety rules set by the General Contractor. All technicians must furnish their own safety equipment including, but not limited to, hard hats, safety glasses, proper footwear (confirm if steel toed boots/shoes are required), fall arrest equipment and safety vests. All safety equipment must be in good working order.

C. Attend all safety orientations and meetings as required by General Contractor.

D. Provide to General Contractor an up to date MSDS binder listing materials planned for use on the job site that require MSDS information. Provide the number of copies requested.

PART 2 - PRODUCTS

2.1 GENERAL

A. All products provided by Contractor shall be new and unused, and shall be of manufacturer's current and standard production.

B. Where two (2) or more equipment items of the same kind are provided, all shall be identical and provided by the same manufacturer.

C. Drawings and specifications indicate major system components, and may not show every component, connector, module or accessory that may be required to support the operation specified. Contractor shall provide all components needed for complete and satisfactory operation.

D. All equipment and materials used shall be standard components, regularly manufactured, regularly utilized in the manufacturer's system.

E. Product Availability

1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed contract time.
2. Certain products specified may only be available through factory authorized dealers and distributors. Contractor shall verify his ability to procure the products specified prior to submitting a proposal.

2.2 VIDEO SURVEILLANCE EQUIPMENT

A. Functional Requirements for Site System

1. General
   a. The Site VSS shall take digital video streams, transmit them via Owner provided network equipment, record these video streams on a NVR, and make them available for live monitoring and investigative review purposes. The system shall operate on a client/recorder platform, whereby client computer workstations may connect to one (1) or multiple recorders.
   b. Video Recording
      1) The NVR(s) shall capture and store video onto an internal hard drive or, if necessary, an external storage device.
      2) The VSS shall have the ability to support an unlimited number of cameras across multiple NVRs.
      3) The system shall allow for selectable image resolution settings. Each NVR shall be capable of handling camera resolutions from 2 megapixel up to 30 megapixel.
      4) The system shall record information about the time, date and source of all video for easy search and retrieval.
      5) The system shall provide for variable video storage duration. The system shall have the capability for recorded video to be saved until all available storage media are filled, and then the oldest video is replaced by new video on a first-in-first-out (FIFO) basis.
      6) Video storage requirements for the Site VSS shall be based on the following and apply to all IP cameras:
         a) 30 days of motion activated recording
         b) 2 megapixel resolution minimum per sensor
         c) 50% motion for a 12-hour period
         d) Average of 10 frames-per-second (FPS) per camera
      7) Cameras shall have the ability to be individually assigned with the following configuration criteria: image quality, image capture rate, video settings, motion settings and recording schedule. Exact camera parameters shall depend on the camera manufacturer and model. The following criteria shall be configurable:
         a) Camera Image Quality
         b) Camera Frame Rate
         c) Camera Video Settings
         d) Camera Motion Detection
         e) Camera Recording Schedule
         f) Camera Pre- and Post-Motion/Event Capture Configurations
            i. Duration, in seconds, of pre-motion/event image capture
            ii. Duration, in seconds, of post-motion/event image capture
            iii. The number of consecutive images exhibiting motion before motion recording begins
            iv. The number of consecutive images of non-motion that represent the end of the motion event
   c. Video Monitoring and Review

1) The SC shall provide a client computer workstation for viewing and configuring all NVRs located at the site
2) Video Display
a) Video shall be viewable through a customizable matrix that includes a full screen mode and split-screen modes of 4, 9, and 16 camera views.
b) The system shall have a 'smart search' ability to search recorded video for motion occurring within a specific area. The system shall create a list of matching video that can be rapidly scanned. When an event of interest is seen, the user shall be able to change modes to view all the video for that time period.
c) The system shall have the capability to display event-based video, such as alarm inputs or motion. The system shall queue and display these events by FIFO or by date/time.
d) The system shall have the capability to display live and recorded video with full VCR-style controls. This feature shall display video from multiple cameras simultaneously. The user shall be able to play video as fast as possible (all images), in real time, or by skipping a selectable number of seconds.
e) The system shall allow the establishment of user groups that have access rights to specific cameras, priority for PTZ control, rights for exporting video and access rights to system log files or other administrative functions.
f) The system shall support full PTZ functions for compatible cameras. The system shall have the ability to control PTZ cameras onscreen by an intuitive virtual control.
g) The camera name, image time and date shall be overlaid on video in the user interface. The user shall have option to deactivate.

d. Video Export and Printing
1) The client interface shall allow the printing of video images to the default printer and the export of video and audio to any device shown as a drive on the system.
2) Export
a) The NVR shall have the ability to export video to the integrated CD/DVD burner or any network drive as determined by IT. The exported data may be played back using software downloaded from the NVR or provided at no cost by the SC.
b) Video and still images shall be time/date stamped and watermarked.
3) Printing
a) The system shall support direct printing of individual images or multiple images to the default system printer. The system name, image time and date stamp, camera name and optional operator-entered comments shall be printed along with each image.

2. System Administration
a. The system shall provide centralized user administration across many systems. Certain aspects of system use and setup shall have configurable permissions. Each aspect of system setup shall be independently selectable on a user-by-user basis. Any system user with administration roles shall be able to create and assign custom permissions to user groups.

B. Technical Specifications

1. Primary Components
a. NVR - Site System
1) The SC shall furnish and install one (1) NVR meeting the requirements listed below. NVR shall be rack mounted in GC provided racks located in IT Room.

2) Minimum specifications (superseded by VMS manufacturer requirements):
   a) CPU: Dual Core Intel Xeon or Intel® Core™ i5 or better
   b) RAM: Minimum 4 GB
   c) Hard Drive: (Internal, size based on paragraph 2.2, A., 1., c., 6). Above – Provide calculations
   d) Operating System: Windows Server 2019 (64 Bit) or Windows® 11 (64 Bit) or as recommended by VMS system manufacturer
   e) Minimum of two (2) 1Gb Ethernet interfaces

b. VMS – Video Management Software
   1) The SC shall furnish and install VMS on the video server creating a NVR system.
   2) Acceptable manufacturers:
      a) Avigilon ACC7
      b) Lenel-S2
      c) Hanwha
      d) Or pre-approved equal

c. Client Computer
   1) Client computer workstations are to be provided for the Site by the SC with required software pre-loaded.
   2) SC provided workstation shall include one (1) 27" LCD monitor and shall be utilized for monitoring/control of both the VSS and ACS. SC is responsible for installing all necessary components and software required for this function.
   3) Any required client workstations shall meet or exceed the manufacturer's specified requirements for the VSS and SMS.
   4) Acceptable manufacturers:
      a) Dell
      b) HP
      c) Or pre-approved equal

d. Network Switch
   1) The SC shall furnish and install a 24-port PoE Ethernet switch capable of supporting the cameras as well as connection to the controller panel(s) for the access control system.
   2) Switch shall support primary data rates of 10/100/1000 Mbps with uplinks capable of 1G/10G transmission to upstream core switches.
   3) Switch shall provide support for 802.3
   4) Switch shall be manageable as part of an overall network management strategy.
   5) Acceptable manufacturers:
      a) HPE/Aruba
      b) Cisco
      c) Extreme
      d) Ruckus

2. Cloud-based recording system will be considered in lieu of a local NVR and storage.

3. Secondary Components
   a. Interior Fixed Mini-Dome IP Cameras
      1) Cameras shall be fully integrated and managed through the NVR.
      2) Any camera susceptible to extreme lighting conditions shall utilize Wide Dynamic technology.
      3) Minimum specifications:
         a) Resolution: 2 megapixel
         b) Imager: 1/4", progressive scan
         c) Min. Illumination: 1 Lux
         d) Lens type: Vari-focal
         e) Power: 12VDC or 24VAC
         f) Connections: RJ-45
         g) Mount: Flush mount if possible
      4) Acceptable manufacturers:
         a) Axis
         b) Avigilon

c) Hanwha
d) or pre-approved equal

b. Exterior Fixed Multi-Sensor IP Cameras
1) IP cameras shall be fully integrated and managed through the NVR.
2) Minimum specifications:
a) Resolution: 9 to 20 megapixels
b) Imager: 1/3" Day/Night, progressive scan
c) Min. Illumination: .08 Lux
d) Power: PoE
e) Connections: RJ-45
f) Mount: wall or corner pendant
3) Acceptable manufacturers:
a) Axis
b) Avigilon
c) Hanwha
c) or pre-approved equal

PART 3 - EXECUTION

3.1 GENERAL

A. Installation shall be performed by skilled technicians under the direction of experienced supervisors, all of whom shall be properly trained and qualified for this work.

B. GC Security Project Manager may visit the job site and inspect the VSS installation at any time during the project.

C. Penetrations:

1. Attempt to avoid work in finished areas. Holes drilled in finished surfaces shall be patched and repaired so that there is no noticeable defect in the surface.
2. Do not drill any structural beams, columns or walls without the permission of the Architect.
3. Do not modify any UL fire-rated door or frame in any way.
4. Seal conduit penetrations through exterior walls.
5. Fire caulk (where required) the interior and exterior of conduit sleeves after all wiring has been placed and the system has been tested.

3.2 EXAMINATION

A. Examine pathway elements intended for cable. Check raceways, cables trays and other elements for compliance with space allocations, installation tolerances, hazards to cable installation and other conditions affecting installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 COLLABORATION

A. The SC shall collaborate with the Owner and technology consultant to plan the precise function and security schema. Further, the authentication levels and assignments, as well as, the access control policies and procedures and all other options shall be designed in conjunction with the Owner's needs.

B. The SC shall present the plan for the Owner and Consultant's approval prior to implementation.

3.4 CONDUIT AND RACEWAY

A. Camera Back Boxes

1. At each exterior camera location, the EC shall provide flush mounted metallic, deep, 4" square box, firmly secured in the wall, or ceiling deck.
2. If the ceiling is removable, attach box to the ceiling grid with proper box T-Bar Support.

B. Provide 4-square junction boxes with covers as required for proper raceway installation.

C. All junction boxes, cabinets and panels shall be NEMA-l rated, unless otherwise noted.

D. All wiring shall be concealed. Surface raceways should only be used in finished spaces. Use plenum-rated cable in all accessible ceiling spaces.

E. The EC is responsible for furnishing and installing conduit, junction boxes, pull boxes, etc. where required to conceal all cabling for both power and video circuits of the entire System. All conduit installed shall be minimum ¾" unless otherwise specified.

F. All conduits shall be installed with pull boxes at a minimum of every 100 feet. Multiple VSS cables and wiring may be run in the same conduit.

3.5 INSTALLATION

A. The EC is responsible for furnishing and installing all 120VAC circuits where required. The EC shall furnish and install all 120VAC hard wired connections and duplex outlets as necessary to provide a complete power system for the VSS.

B. The TC is responsible for furnishing and installing all VSS category cabling for video circuits.

C. Plenum cable shall be utilized when running cable through plenum-rated ceilings and in conjunction with NEC guidelines.

D. Conductors within enclosures shall be carefully cabled and laced. All cables shall be identified with printed wire markers.

E. Cable shall be run in conduit, stubbed up into open ceiling space and then shall route to appropriate telecom room via j-hooks or similar approved support.

F. Visually inspect wire and cable for faulty insulation before installation. Protect cable ends at all times with acceptable end caps except during actual termination. Protect wire and cable from kinks. Provide grommets and strain relief material where necessary, to avoid abrasions or excess tension on wire and cable.

G. Plenum wiring will not be spliced outside of control devices unless absolutely necessary. If plenum wire splicing is approved, then it must be done within an approved enclosure containing wire nut connections located in an accessible area. Identify boxes with a blue letter "S" painted, stenciled or with permanent marker, centered on cover.

H. Identification and Tagging

1. All cables and wires shall be properly identified on both ends.
2. Provide temporary stickers or tags on ceiling grid to indicate where devices are to be installed later for the VSS.

I. Wiring Protection and Splicing: SC, TC and EC shall comply with all Division-26 requirements.

J. Wiring shall not be attached to wiring of other systems, sprinkler pipes or other objects that may cause interference, life safety problems or inconvenience to other trades.

K. VSS wiring shall be supported directly from the building structure or permanent walls using appropriate hangers.

L. VSS wiring shall be separated a minimum of 6" from line voltage electrical wiring, telephone wire, data wiring, etc. Plenum cable shall be routed no closer than 12" (300 mu) from any fluorescent or high discharge electrical lighting, and 4'-0" from voltages and transformers greater than 600 volts.

M. A wire service loop of no less than 16’ shall be provided for each camera for potential camera relocation. This shall include all wires necessary for camera function.

N. Grounding:

1. Grounding shall be per Manufacturer's written recommendations and shall also be fully coordinated with the Owner.

O. Comply with all requirements of Division-26 Specifications.

3.6 LABELING

A. Label all cables using approved scheme. Label horizontal cables at the device and equipment chassis within 12” of termination. Affix labels in a visible location. All labels must be machine made and permanently attached. Label access control interface cables on both ends with door number. Label all equipment chassis per approved labeling scheme.

3.7 FIELD QUALITY CONTROL

A. Inspection: Verify that units and controls are properly installed, connected and labeled and that interconnecting wires and terminals are identified.

B. Test Schedule: Schedule tests after pretesting has successfully been completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days’ notice of test schedule.

C. Operational Tests: Perform operational system tests to verify that system complies with specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

3.8 OPERATIONAL INSTRUCTION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate and maintain VSS equipment.

B. Train Owner's maintenance personnel on procedures and schedules for troubleshooting, servicing and maintaining equipment.

C. Demonstrate methods of determining optimum alignment and adjustment of components and settings for system controls.

D. Schedule training with Owner, through Architect, with at least seven days advance notice.

3.9 ON-SITE ASSISTANCE

A. Occupancy Adjustments: When requested by Owner within one year of date of substantial completion, provide on-site assistance in tuning and adjusting the system to suit actual occupied conditions and to optimize performance. Provide up to two adjustments at project site for this purpose, without additional cost.

END OF SECTION 282300

SECTION 28 31 00
FIRE ALARM EMERGENCY COMMUNICATION SYSTEM

PART 1 - GENERAL

1.01 Scope

This specification document provides the requirements for the installation, programming, and configuration of a complete Silent Knight IFP-2000ECS digital protocol analog addressable fire alarm system with integrated Emergency Communication System capabilities (ECS). This system shall include, but not be limited to, system cabinet, power supply, voice command module, microphone, built in Signaling Line Circuit (SLC), 160-character LCD annunciator, eight programmable Flexputs™, built in dual line digital communicator associated peripheral devices, batteries, wiring, conduit and other relevant components and accessories required to furnish a complete and operational life safety system.

1.02 Work Included

A. General Requirements

The contractor shall furnish and install a complete 24 VDC, electrically supervised, analog addressable fire alarm system with emergency communication as specified herein and indicated on the drawings. The system shall include but not be limited to all control panels, audio amplifiers, power supplies, initiating devices, audible and visual notification appliances, alarm devices, and all accessories required to provide a complete operating fire alarm system.

B. Listings

All fire alarm system equipment shall be listed for it's intended purpose and be compatibility listed to assure the integrity of the complete system.

1.03 Standards

The fire alarm equipment and installation shall comply with the current provisions of the following standards and shall be listed for it's intended purpose and be compatibility listed to ensure integrity of the complete system.

A. National Electric Code, Article 760

B. National Fire Protection Association Standards:

NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm and Signaling Code
NFPA 101	Life Safety Code

C. Local and State Building Codes

All Current Codes adopted by Division of State Architect including California Fire Code and Building Codes as listed on the drawings.

D. Local Authorities Having Jurisdiction

E. Underwriters Laboratories Inc.

All equipment shall be approved by Underwriters Laboratories, Inc. for its intended purpose, listed as power limited by Underwriters Laboratories, Inc., for the following standards as applicable:

UL 864 UOJZ	Control units for Fire Protective Signaling Systems Local Signaling Unit Central Station Signaling Protected Premises Unit Remote Signaling Protected Premises Unit. Water Deluge Releasing Unit
UL 2572	Mass Notification Standard
UL 268	Smoke Detectors for Fire Protective Signaling systems
UL 268A	Smoke Detectors for duct applications
UL 217	Smoke Detectors for Single Stations
UL 521	Heat Detectors for Fire Protective Signaling systems
UL 228	Door Holders for Fire Protective Signaling systems
UL 464	Audible Signaling appliances
UL 1638	Visual Signaling appliances
UL 38	Manually Activated Signaling Boxes
UL 346	Waterflow indicators for Fire Protective Signaling systems
UL 1481	Power Supplies for Fire Protective Signaling systems.
UL1711	Amplifiers for Fire Protection Signaling Systems

F. Americans with Disabilities Act (ADA)

All visual Notification appliances and manual pull stations shall comply with the requirements of the Americans with Disabilities Act.

1.04 General Requirements

A. Manufacturers/Distributors Services

1. The following supervision shall be provided by a factory trained service technician from the distributor of the fire alarm equipment. The technician shall be trained and shall have a minimum of two (2) years of service experience in the fire alarm industry. The technicians name shall appear on equipment submittals and a copy of his manufactures trained shall be sent to the project engineer. The technician shall be responsible for the following items:

    a. A pre installation visit to the job site to review equipment submittals and to verify the method by which the system is to be wired.
    b. During the installation the certified technician shall be on site or make periodic visits to verify installation and wiring of the system. He shall also supervise the completion of conduit rough, wires pulled into conduit and wiring rough, and ready for trim.
    c. Upon completion of wiring, final checkout and certification of the system shall be made under the supervision of this technician.
    d. At the time of the formal checkout, technician shall give operational instructions to the owner and or his representative on the system.

B. Submittals

The contractor shall submit three (3) complete sets of documentation within thirty (30) calendar days after award of the purchase order. Indicated in the document will be the type, size, rating, style, catalog number, manufacturer's names, photos, and /or catalog data sheets for all items proposed to meet these specifications. The proposed equipment shall be subject to the

approval of the Architect/Engineer and no equipment shall be ordered or installed on the premises without that approval.

NOTE: DOCUMENTATION - Submittal of shop drawings shall contain at least three (3) copies of original manufacturer specification and installation instruction sheets. Subsequent information may be copies. All equipment and devices on the shop drawings to be furnished under this contract shall be clearly marked in the specification sheets.

Supplier qualifications shall be submitted indicating years in business, service policies, warranty definitions, NICET certification, and completion of factory training program and a list of similar installations.

Contractor qualifications shall be supplied indicating years in business and prior experience with installations that include the type of equipment that is to be supplied.

The contractor shall provide hourly service rates, performed by a factory trained technician for this installed life safety system with the submittal. Proof of training and authorization shall be included with the submittal. These hourly service rates shall be guaranteed for a 1-year period.

C. Contract Close-out Submittals

Deliver two (2) copies of the following to the owner's representative within Thirty (30) days of system acceptance. The closeout submittals shall include:

1. Installation and Programming manuals for the installed life safety system.

2. Point to point diagrams of the entire life safety system as installed. This shall include all connected smoke detectors and addressable field modules.

3. All drawings must reflect device address as verified in the presence of the engineer and/or end user.

D. Warranty

Unless otherwise specified, all materials, installation and workmanship shall have a warranty for a three (3) year period. A copy of the manufacturer warranty shall be provided with the close out documentation.

E. Products

This life safety system specification must be conformed to in its entirety to ensure that the installed and programmed life safety system will accommodate all of the requirements and operations required by the building owner. Any specified item or operational feature not specifically addressed prior to the bid date will be required to be met without exception.

Submission of product purported to be equal to those specified herein will be considered as possible substitutes only when all the following requirements have been met:

1. Any deviation from the equipment, operations, methods, design, or other criteria specified herein must be submitted in detail to the specifying architect or engineer a minimum of ten (10) working days prior to the scheduled submission of bids. Each deviation from the operation detailed in these specifications must be documented in detail, including page number and section number, which list the system function for which the substitution is being proposed.

2. A complete list of such substituted products with three (3) copies of working drawings thereof shall be submitted to the approved Architect and/or Consulting Engineer not less than ten (10) working days prior to the scheduled submission of bids.

3. The contractor or substitute bidder shall functionally demonstrate that the proposed substitute products are in fact equal in quality and performance to those specified herein.

F. General Equipment and Materials Requirements

All equipment furnished for this project shall be new and unused. All components shall be designed for uninterrupted duty. All equipment, materials, accessories, devices, and other facilities covered by this specification or noted on the contract drawings and installation specification shall be best suited for the intended use and shall be provided by a single manufacturer. If any of the equipment provided under this specification is provided by different manufacturers, then that equipment shall be "Listed" as to its compatibility by Underwriters Laboratories (UL), if such compatibility is required by UL standards.

G. Satisfying the Entire Intent of these Specifications

It is the contractor's responsibility to meet the entire intent of these specifications. Deviations from the specified items shall be at the risk of the contractor until the date of final acceptance by the architect, engineer, and owner's representative. All costs for removal, relocation, or replacement of a substituted item shall be at the risk of the electrical contractor.

PART 2 - PRODUCTS

2.01 General

A. Control Panel with Emergency Communication System

1. The fire alarm control panel (FACP) shall be the Silent Knight IFP-2000ECS analog addressable control panel. The audio amplifiers shall be the Silent Knight ECS-50W, ECS-125W, or ECS-DUAL50W voice evacuation units. The FACP must have a 9-amp power supply and be capable of expansion to a minimum of 54 total amps via bus connected expander modules that supervise low battery, loss off AC and loss of communication.

2. The system must contain at least one (1) Silent Knight ECS-50W, ECS-125W, or ECS-DUAL-50W watt amplifier and shall be expandable from 50 to 2000 watts utilizing up to 15 additional amplifiers. The ECS-50W and ECS-125W amplifiers shall be capable of adding a 4-zone splitter (Silent Knight ECS-CE4) to distribute the audio information to different locations in the installation. The system shall have the capability of controlling up to 40 notification zones. The amplifiers must contain the capability of being remotely located through a four-wire SBUS communications circuit and a two-wire VBUS voice circuit. The system shall have the capability of adding up to 7 ECS-RCU2000 remote command units.

3. The voice evacuation system must have the capability of downloading fifteen (15) 60 second messages and utilize DSP technology for higher audio intelligibility.

4. The voice evacuation system shall be capable of operating at 25vrms or 70.7vrms (ECS-50W and ECS-DUAL50W only) and must be field selectable at the amplifier level. Systems that require additional modules for voltage conversion shall not be accepted.

5. The FACP must have Day/Night sensitivity capabilities on detectors and be capable of supporting up to 636 analog addressable points. This shall be accomplished via signaling line circuits (SLC) capable of supporting a minimum of 127 devices of any mix and match.

The main panel will contain one SLC circuit with the option of utilizing 5815XL expander modules. The communication protocol on the SLC loop must be digital.

6. The FACP must support a minimum of eight programmable Flexput™ circuits. The panel must have a built in 160-character LCD annunciator with the capability of having an additional supervised remote annunciators connected in the field.

7. The FACP must have a built in UL approved digital communicator. The communicator must allow local and remote up/downloading of system operating options, event history, and detector sensitivity data.

8. The FACP must automatically test the smoke detectors in compliance with NFPA standards to ensure that they are within listed sensitivity parameters and be listed with Underwriters Laboratories for this purpose.

9. The FACP must compensate for the accumulation of contaminants that affect detector sensitivity. The FACP must have day/night sensitivity adjustments, maintenance alert feature (differentiated from trouble condition), detector sensitivity selection, auto-programming mode (Jumpstart) and the ability to upgrade the core programming software on site or over the telephone.

10. The FACP shall have a Jumpstart feature that can automatically enroll all properly connected accessories into a functional system within 60 seconds of powering up the panel. Panels that do not have these capabilities will not be accepted.

11. The main communication bus (SBUS RS485) shall be capable of class A or class B configuration with a total SBUS length of 6,000 feet.

B. System Wiring

The Signaling Line Circuit (SLC) and Data Communication Bus (SBUS) shall be wired with standard NEC 760 compliant wiring. No twisted, shielded, or mid capacitance wiring is required for standard installations. All FACP screw terminals shall be capable of accepting 14-18 AWG wire. All system wiring shall be in accordance with the requirements of NFPA 70, the National Electrical Code (NEC) and comply with article 760 of the NEC.

C. Signaling Line Circuits

Each SLC shall be capable of a wiring distance of 10,000 feet from the panel or SLC driver module (5815XL) and be capable of supporting 127 devices. The communication protocol to SLC devices must be digital. Any SLC loop device, which goes into alarm, must interrupt the polling cycle for priority response from the FACP. The FACP must respond consistently to a device that goes into alarm on an SLC in within 10 seconds. The auxiliary 5815XL SLC loop module must be capable of being located up to 6,000 feet from the FACP on a SBUS, which is separate from the SLC. The SLC shall be capable of functioning in a class A or class B configuration.

D. SLC Loop Devices

Devices supported must include analog photoelectric, ionization smoke detectors, analog heat detectors, addressable input modules, relay output modules or addressable notification modules. Each SLC loop shall support up to 127 devices of any mix and match.

E. Analog Detector Functions

The products of combustion detectors must communicate analog values using a digital protocol to the control panel for the following functions:

1. Automatic compliance with NFPA 72 standards for detector sensitivity testing

2. Drift compensation to assure detector is operating correctly

3. Maintenance alert when a detector nears the trouble condition

4. Trouble alert when a detector is out of tolerance

F. Sensitivity Function

The FACP shall have the ability to set three different sensitivity levels. A zone can be programmed to a day and a night sensitivity value. The day/night schedule shall allow for 16 holiday dates that are user programmable to allow the FACP to respond at the night level on those days.

G. Programmable Flexputs™

The FACP shall support eight programmable Flexput™ circuits that are capable of being programmed as supervised reverse polarity notification circuits or supervised auxiliary power circuits that can be programmed as continuous, resettable or door holder power. The circuits shall also be programmable as input circuits in class A or B configurations to support dry contact or compatible two wire smoke detectors.

H. Addressable Notification Module

The contractor shall furnish and install where indicated on the plans, addressable notification modules, Silent Knight Model SD500-ANM. The modules shall be U.L. listed compatible with Silent Knight's IFP-2000ECS fire alarm control panel. The notification module must provide one class A (Style Z) or class B (Style Y) notification output with one auxiliary power input. The notification module must be suitable for mounting in a standard 4 square electrical box and must include a plastic cover plate. The notification module must provide an LED that is visible from the outside of the cover plate. The notification module must be fully programmable for such applications as required by the installation. The SD500-ANM shall reside on the SLC loop and can be placed up to 10,000 feet from the control or 5815XL SLC loop module.

I. Annunciator

The main control must have a built-in annunciator with a 160-character LCD display and feature LED's for Alarm, Supervisory, Trouble, Silenced and Power. When in the normal condition the LCD shall display time and date based on a 200-year clock which is capable of automatic daylight savings time adjustments. All controls and programming keys are silicone mechanical type with tactile and audible feedback. Keys have a travel of .040 in. No membrane style buttons will be permissible. The annunciator must be able to silence and reset alarms using a keypad entered code. The annunciators must have twenty levels of user codes that will allow the limitation of operating system programming to authorized individuals.

J. Remote Annunciators

The fire system shall be capable of supporting remote annunciators. LCD Remote annunciator, Model RA-2000, shall have the same control and display layout so that they match identically the built-in annunciator. Remote annunciators shall be available in two colors, red and light

gray. Remote annunciators shall have the same functionality and operation as the built-in annunciator. All annunciators must have 160-character LCD displays and must feature five LED's for Alarm, Supervisory, Trouble, Silenced, and Power. All controls and programming keys are silicone mechanical type with tactical and audible feedback. Keys shall have a travel of .040 inches. No membrane style buttons will be permitted.

The annunciator must be able to silence and reset alarms through the use of a code entered on the annunciator keypad. The annunciator must have twenty levels of user codes that will limit the operating system programming to authorized individuals. The control panel must allow all annunciators to accommodate multiple users input simultaneously. Remote annunciators shall be capable of operating at a distance of 6,000 feet from the main control panel on unshielded, non-twisted cable.

K. I/O Module

The fire system shall be able to support I/O modules (SK5880) that shall be used to drive remote LED graphic style displays and accommodate up to eight dry contact type switch inputs, including ECS inputs. The I/O modules shall each drive up to 40 LEDs without requiring external power connections. The I/O module inputs shall be supervised and be suitable for alarm and trouble circuits as well as reset and silence switches. The system shall also support up to 40 LED drivers that reside on the two-wire SLC loop. These driver boards shall contain 80 LED outputs that are powered by an external power source.

L. Serial/Parallel Interface

The fire system shall be capable of supporting up to two serial/parallel interfaces (SK5824) that are capable of driving standard computer style printers. The interface shall be programmable for the serial and parallel ports and allow printing of events as they occur.

M. Distributed Power Modules

The contractor shall supply power modules, Models RPS-1000 and 5496, compatible with the IFP-2000ECS fire alarm control panel. The RPS-1000 power module must have 6 amps of output power, six Flexput™ circuits rated at 3amps each, and two form C relay circuits rated at 2.5 amps at 24 volts DC. The six Flexput™ circuits shall have the same functionality as the Flexput™ circuits on the main panel. The RPS-1000 shall be capable of being connected via an RS-485 system bus (SBUS) at a maximum distance of 6,000 feet from the main control panel. The RPS-1000 shall contain an additional RS-485 bus that is completely compatible with all IFP-2000ECS add on modules, including 5815XL SLC expanders, RA-2000-SK5865-SK5880 annunciators, 5824 serial/parallel module and addressable devices. The RPS-1000 will also act as a bus repeater so that additional RS-485 (modules) devices can be connected at a maximum distance of 6,000 feet from the power module.

The 5496-power module must have 6 amps of output power and four circuits rated at 3 amps each. The four circuits can be programmed as notification outputs or auxiliary power outputs of door holder, constant and resettable types.

N. Digital Communicator

The digital communicator must be an integral part of the control panel and be capable of reporting all zones or points of alarm, supervisory, and trouble as well as all system status information such as loss of AC, low battery, ground fault, loss of supervision to any remote devices with individual and distinct messages to a central station or remote station. The communicator must also be capable of up/downloading of all system programming options, event history and detector sensitivity compliance information to a PC on site or at a remote

location.

The communicator shall have an answering machine bypass feature that will allow the panel to respond to communication even on phone lines that have other communication equipment present. The communicator must be capable of reporting via SIA and Contact ID formats. The communicator shall have a delayed AC loss report function which will provide a programmable report delay plus a 10-25 min random component to help ease traffic to the central station during a power outage. No controls that use external modems for remote programming and diagnostics shall be accepted.

O. Dry Contacts

The FACP will have three form “C” dry contacts, one will be dedicated to trouble conditions, the other two will be programmable for alarm, trouble, sprinkler supervisory, notification, pre-alarm, waterflow, manual pull, aux. 1 or aux. 2. The trouble contact shall be normal in an electrically energized state so that any total power loss (AC and battery) will cause a trouble condition. If the microprocessor on the FACP fails, the trouble contacts shall also indicate a trouble condition.

P. Ground Fault Detection

A ground fault detection circuit shall be used to detect positive and negative grounds on all field wiring. The ground fault detector shall operate the general trouble devices as specified but shall not cause an alarm to be sounded. Ground faults will not interfere with normal operation, such as alarm, or other trouble conditions.

Q. Overcurrent Protection

All low voltage circuits will be protected by microprocessor-controlled power limiting or have a self restoring polyswitches for the following: smoke detector power, main power supply, indicating appliance circuits, battery standby power and auxiliary output.

R. Test Functions

A “Lamp Test” mode shall be a standard feature of the fire alarm control panel and shall test all LED’s and the LCD display on the main panel and remote annunciators.

1. A “Walk Test” mode shall be a standard feature of the fire alarm control panel. The walk test feature shall function so that each alarm input tested will operate the associated notification appliance for 6 to 180 seconds. The FACP will then automatically perform a reset and confirm normal device operation. The event memory shall contain the information on the point tested, the zone tripped, the zone restores and the individual points return to normal.

2. A “Fire Drill” mode shall allow the manual testing of the fire alarm system notification circuits. The fire drill shall be capable of being controlled at the main annunciator, remote annunciators and via a remote contact input.

A “Bypass Mode” shall allow for any point or NAC circuit to be bypassed without effecting the operation of the total fire system.

S. Remote Input Capabilities

The control panel shall have provisions for supervised switch inputs for the purpose of alarm

reset and alarm and trouble silence.

T. Notification Appliance Mapping Structure

All notification circuits and modules shall be programmable via a mapping structure that allows for a maximum of 999 output groups. Each of these groups shall have the ability to be triggered by any of the panels 999 zones, panel wide events, or site wide events. Additionally, each zone, panel, or site will individually control the cadence pattern of each of the groups that it is mapped to so that devices can indicate a variety of conditions. The zone, panel, or site shall be capable of issuing a different cadence pattern for each of the groups under its control. The mapping structure must also allow a group to be designated to “ignore cadence” for use with strobes and other continuous input devices. Zones shall have ten different output categories: Detector Alarm, Trouble, Supervisory, Pre-alarm, Waterflow, Manual Pull, Zone Auxiliary 1 and Zone Auxiliary 2, CO Alarm and CO Supervisory. Each of the categories shall have the ability to control output groups with a cadence pattern. The patterns are; March code, ANSI 3.41, Single Stroke Bell Temporal, California Code, Zone 1 Coded, Zone 2 Coded, Zone 3 Coded, Zone 4 Coded, Zone 5 Coded, Zone 6 Coded, Zone 7 Coded, Zone 8 Coded, Custom Output Pattern 1, Custom Output Pattern 2, Custom Output Pattern 3, Custom Output Pattern 4, Constant, System Sensor Synchronization, Wheelock Synchronization, Gentex Synchronization, Amseco Synchronization, and Faraday Synchronization. This mapping/cadence pattern shall be supported by all system power supplies. 15 recordable one-minute messages are available that can be mapped to eight ECS buttons. ECS messages can have priority over fire alarm outputs.

U. -board Programmer

The FACP shall have an on-board programmer which will allow for all system functions and options, except for mapping, to be programmed via the on-board annunciator keypad. Any panel that does not have this capability will not be accepted.

V. Downloading Software

The fire alarm control panel must support up/downloading of system programming from a PC. The FACP must also be able to download the detector sensitivity test results and a 1,000-event system event buffer to the PC. Communication shall take place over a direct connection to the PC and/or via the same telephone lines as the built-in digital communicator and shall not require an external modem to be connected to the panel. The downloading software shall contain a code that will block unauthorized persons from accessing the panel via direct connection or over the phone lines.

W. English Language Descriptions

The FACP shall provide the ability to have a text description of each system device, input zone and output group on the system. The use of individual lights to provide descriptions will not be acceptable.

2.02 SYSTEM OPERATION

A. Alarm

When a device indicates any alarm condition the control panel must respond within 10 seconds. All programmed audio and visual devices will activate at this time. The Alarm or Supervisory LED on the annunciator(s) should light and the LCD should prompt the user as to the number of current events. The alarm information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators.

When the alarmed device is restored to normal, the control panel shall be required to be manually reset to clear the alarm condition, except that the alarms may be silenced as programmed.

An alarm shall be silenced at the main or remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur (subsequent alarm feature). When alarms are silenced the silenced LED on the control panel, and on any remote annunciators shall remain lit, until the alarmed device is returned to normal.

B. Troubles

When a device indicates a trouble condition, the control panel System Trouble LED should light and the LCD should prompt the user as to the number of current events. The trouble information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators.

When the device in trouble is restored to normal, the control panel shall be automatically reset. The trouble restore information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators. A trouble shall be silenced at the main or remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur.

C. Supervision Methods

Each SLC loop shall be electrically supervised for opens and ground faults in the circuit wiring and shall be so arranged that a fault condition on any loop will not cause an alarm to sound. Additionally, every addressable device connected to the SLC will be supervised and individually identified if in a fault condition. The occurrence of any fault will light a Trouble LED and sound the system trouble sounder but will not interfere with the proper operation of any circuit which does not have a fault condition.

Each indicating appliance circuit shall be electrically supervised for opens, grounds and short circuit faults, on the circuit wiring, and shall be so arranged that a fault condition on any indicating appliance circuit or group of circuits will not cause an alarm to sound. The occurrence of any fault will light the trouble LED and sound the system trouble sounder but will not interfere with the proper operation of any circuit which does not have a fault condition.

PART 3 - SYSTEM COMPONENTS

3.01 CONTROL UNIT

A. System Cabinet

1. Mounting

The system cabinets shall be red and can be either surface or flush mounted.

2. Audible System Trouble Sounder

An audible system trouble sounder shall be an integral part of the control unit. Provisions shall also be provided for an optional supervised remote trouble signal.

B. Power Supply and Charger

1. The entire system shall operate on 24 VDC, filtered switch mode power supply with the

rated current available of 9 Amps. The FACP must have a battery charging circuit capable of complying with the following requirements:

a. Sixty (60) hours of battery standby with five (5) minutes of alarm signaling at the end of this sixty (60) hour period (as required per NFPA 72 remote station signaling requirements) using rechargeable batteries with automatic charger to maintain standby gel-cell batteries in a fully charged condition.

OR

b. Twenty-four (24) hours of battery standby with five (5) minutes of alarm signaling at the end of this twenty-four (24) hour period (as required per NFPA 72 central station signaling requirements) using rechargeable batteries with automatic charger to maintain gel-cell batteries in a fully charged condition.

2. The power supply shall comply with U.L. Standard 864 for power limiting.

The FACP will indicate a trouble condition if there is a loss of AC power or if the batteries are missing or of insufficient capacity to support proper system operation in the event of AC failure. A “Battery Test” will be performed automatically every minute to check the integrity of the batteries. The test must disconnect the batteries from the charging circuit and place a load on the battery to verify the battery condition.

If it is necessary to provide additional power one or more of the Model RPS-1000 or 5496 distributed power modules shall be used to accomplish this purpose.

C. Connections and Circuits

Connections to the light and power service shall be on a dedicated branch circuit in accordance with the National Fire Alarm Code NFPA 72, National Electrical Code (NEC) NFPA 70, and the local authority having jurisdiction (AHJ). The circuit and connections shall be mechanically protected.

A circuit disconnecting means shall be accessible only to authorized personnel and shall be clearly marked “FIRE ALARM CIRCUIT CONTROL”.

PART 4 - ACCESSORY COMPONENTS

4.01 The FACP shall support the following devices on the RS-485 data bus:

ECS-VCM	Voice Control Module
ECS-SW24	Additional 24 Zone Switch Module
ECS-INT50W	Intelligent 50-Watt Internal Amplifier
ECS -125W	Intelligent 50-Watt Internal Amplifier
ECS-DUAL50W	50/100-Watt Dual Channel Amplifier with 50-Watt Backup
ECS-CE4	4 Zone Splitter
ECS-RCU	Remote Microphone (7 max.)
5815XL	Signaling Line Circuit Expander (SLC) Module
5824	Printer Interface Module
RA-2000	LCD Remote Annunciator
5865-3	LED Remote Annunciator
5865-4	LED Remote Annunciator with reset and silence switches
5880	LED I/O module
RPS-1000	Intelligent Distributed Power Module
5496	Intelligent Distributed Power Module

4.02 The FACP shall support the operation of 127 devices per SLC loop without regard to type. The following devices shall be supported:

SD505-PHOTO	Addressable Photoelectric Smoke Detector
SD505-HEAT	Addressable Heat Detector
SD505-6AB	6” detector base
SD500-AIM	Addressable Input Module
SD500-MIM	Mini Input Module
SD500-ARM	Addressable Relay Module
SD500-ANM	Addressable Notification Module
SD500-SDM	Two Wire Smoke Detector Module
SD500-LIM	Isolation Module
SD505-6IB	Addressable Isolator base
SD505-6RB	Detector Relay Base
SD505-6SB	Detector Sounder Base
SD500-PS	Addressable Single Action Pull Station

4.03 The FACP shall support these other Silent Knight devices via addressable input, addressable notification, or addressable output modules.

IDP-FIRE-CO	Advanced Multi-Criteria Fire/CO Detector
B200S	Intelligent sounder base

4.04 Furnish and install, where shown on the drawings, the following devices

A. Manual Fire Alarm Stations

Manual fire alarm stations shall be non-coded, break glass, single or double action type, with a key operated test-reset lock in order that they may be tested, and so designed that after actual emergency operation, they cannot be restored to normal except by use of a key. The reset key shall be so designed that it will reset manual station and open FACP without use of another key. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of fifty feet, front or side. Manual stations shall be constructed of die cast metal or polycarbonate with clearly visible operating instructions on the front of the stations in raised letters. Stations shall be suitable for surface mounting on matching backbox, or semi-flush mounting on a standard single gang box, and shall be installed within the limits defined by the Americans with Disabilities Act (ADA) dependent on manual station accessibility or per local requirements. Manual stations shall be installed in conjunction with an addressable input module, SD500-AIM or SD500-MIM. Manual stations shall be Silent Knight Underwriters Laboratories listed.

B. Remote Power Supplies

The remote power supplies for notification appliances shall be the Silent Knight Model RPS-1000 or 5496. The Model RPS-1000 intelligent power supply shall wire on the main SBUS and be programmed through the IFP-2000ECS. It will support 6 amps of 24 volt DC power with 6 Flexput™ circuits, rated at 3 amps each. Two additional 5815XL SLC loop expanders shall be capable of be install in the cabinet. The power supply will also regenerate the SBUS for an additional 6000 feet of SBUS capability.

The Silent Knight 5496 intelligent power supply shall wire on the main SBUS and be programmed through the IFP-2000ECS. It will support 6 amps of 24 volt DC power with 4 notification circuits, rated at 3 amps each.

The remote power supply model 5499 or 5495 may also be used on the system. These power

supplies are activated by a notification circuit or an IDP-Control module and support 6amps of 24VDC power, with 4 notification circuits, rated at 3amps each.

C. Notification Devices

The visible and audible/visible signal shall be System Sensor series signal devices and be listed by Underwriters Laboritories Inc. per UL 1971 and/or 1638 and UL 464. The notification appliance (combination audible/visible units only) shall produce a peak sound output of 90dba or greater as measured in an anechoic chamber. The signaling appliance shall also have the capability to silence the audible signal while leaving the visible signal energized with the use of a single par of wires. Additionally, the user shall be able to select either continuous or temporal tone output with the temporal signal having the ability to be synchronized. The visible signaling appliance shall maintain a minimum flash rate of 1Hz or greater regardless or power input voltage. The appliance shall also be capable of meeting the candela requirements of the blueprints presented by the engineer and ADA. The appliance shall be polarized to allow for electrical supervision of the system wiring. The unit shall be provided with terminals with barriers for input/output wiring and be able to mount to a single gang or double gang box or double workbox with the use of an adapter plate. The unit shall have an input voltage range of 20-30 volts with either direct current or full wave rectified power.

D. Smoke Detectors

Smoke detectors shall be Silent Knight Model SD505-APS ceiling mounted, analog/addressable photoelectric smoke detectors. The combination detector head and twist lock base shall be U.L. listed compatible with the Silent Knight IFP-2000ECS fire alarm control panel. The base shall permit direct interchange with Silent Knight's SD505-AIS or SD505-AHS detectors. The base shall be the appropriate twist lock base SD505-6AB. The smoke detector shall have a flashing status LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady at full brilliance. The detector may be reset by actuating the control panel's reset switch. The sensitivity of the detector shall be capable of being selected and measured by the control panel without the need for external test equipment. The vandal security-locking feature shall be used in those areas as indicated on the drawing. The locking feature shall be field selectable when required. It shall be possible to perform a sensitivity test of the detector without the need of generating smoke. The test method shall simulate the effects of products of combustion in the chamber to ensure testing of the detector circuits. Detectors shall have completely closed back to restrict entry of dust and air turbulence and have a 30-mesh insect screen. Electronics of the unit shall be shielded to protect against false alarms from E.M.I. and R.F.I.

E. Heat Detectors

Furnish and install analog/addressable heat detectors, Silent Knight model SD505-AHS. The combination heat detector and twist lock base shall be U.L. listed compatible with the Silent Knight IFP-2000ECS fire alarm control panel. The base shall permit direct interchange with the Silent Knight SD505-AIS or SD505-APS detectors. The base shall be appropriate twist lock base SD505-6AB. The heat detector shall have a flashing status LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady at full brilliance. The detector may be reset by actuating the control panel's reset switch. The vandal security-locking feature shall be used in those areas as indicated on the drawings. Electronics of the unit shall be shielded to protect against false alarms from E.M.I. and R.F.I.

F. Duct Detectors

Duct Detector shall be Silent Knight Model SD505-DUCT or SD505-DUCTR. The duct detector comes with a SD505-APS photoelectric smoke detector head. The SD505-DUCTR comes with

a built-in relay.

PART 5 - WIRING

5.01 Installer's Responsibilities

A. The installer shall coordinate the installation of the fire alarm equipment. All conductors and wiring shall be installed according to the manufacturer's recommendations.

B. It shall be the installer's responsibility to coordinate with the supplier, regarding the correct wiring procedures before installing any conduits or conductors.

5.02 Installation of System Components

A. System components shall be installed in accordance with the latest revisions of the appropriate NFPA pamphlets, the requirements contained herein, National Electrical Code, local and state regulations, the requirements of the fire department and other applicable authorities having jurisdiction (AHJ).

B. All wire used on the fire alarm system shall be U.L. Listed as fire alarm protection signaling circuit cable per National Electrical Code, Articles 760.

PART 6 - WARRANTY AND FINAL TEST

6.01 General

The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for one year (365 days) from the date of final acceptance.

6.02 Final Test

Before the installation shall be considered completed and acceptable by the awarding authority, a test of the system shall be performed as follows:

A. The contractor's job foreman, a representative of the owner, and the fire department shall operate every building fire alarm device to ensure proper operation and correct annunciation at the control panel.

B. At least one half of all tests shall be performed on battery standby power.

C. Where application of heat would destroy any detector, it may be manually activated.

D. The communication loops and the indicating appliance circuits shall be opened in at least two (2) locations per circuit to check for the presence of correct supervision circuitry.

When the testing has been completed to the satisfaction of both the contractor's job foreman and owner, a notarized letter cosigned by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the fire department.

The contractor shall leave the fire alarm system in proper working order, and, without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within one year (365 days) from the date of final acceptance by the awarding authority.

Prior to final test the fire department must be notified in accordance with local requirements.

6.03 As Built Drawings, Testing, and Maintenance Instructions

A. As Built Drawings

A complete set of reproducible "as-built" drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment shall be delivered to the owner upon completion of system.

B. Operating and Instruction Manuals

Operating and instruction manuals shall be submitted prior to testing of the system. Three (3) complete sets of operating and instruction manuals shall be delivered to the owner upon completion. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with U.L. Standard 864.

END OF SECTION

SYSTEM RECORD OF COMPLETION

This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.
Attach additional sheets, data, or calculations as necessary to provide a complete record.

Form Completion Date: _____ Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

Description of property: _____

Name of property representative: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

2. INSTALLATION, SERVICE, TESTING, AND MONITORING INFORMATION

Installation contractor: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Service organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Testing organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Effective date for test and inspection contract: _____

Monitoring organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Account number: _____ Phone line 1: _____ Phone line 2: _____

Means of transmission: _____

Entity to which alarms are retransmitted: _____ Phone: _____

3. DOCUMENTATION

On-site location of the required record documents and site-specific software: _____

4. DESCRIPTION OF SYSTEM OR SERVICE

This is a: ☐ New system ☐ Modification to existing system Permit number: _____

NFPA 72 edition: _____

4.1 Control Unit

Manufacturer: _____ Model number: _____

4.2 Software and Firmware

Firmware revision number: _____

4.3 Alarm Verification

☐ This system does not incorporate alarm verification.

Number of devices subject to alarm verification: _____ Alarm verification set for _____ seconds

5. SYSTEM POWER

5.1 Control Unit

5.1.1 Primary Power

Input voltage of control panel: _____ Control panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Branch circuit disconnecting means location: _____ Number: _____

5.1.2 Secondary Power

Type of secondary power: _____

Location, if remote from the plant: _____

Calculated capacity of secondary power to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

5.2 Control Unit

☐ This system does not have power extender panels

☐ Power extender panels are listed on supplementary sheet A

6. CIRCUITS AND PATHWAYS

Pathway Type	Dual Media Pathway	Separate Pathway	Class	Survivability Level
Signaling Line				
Device Power				
Initiating Device				
Notification Appliance				
Other (specify):				

7. REMOTE ANNUNCIATORS

Type	Location

8. INITIATING DEVICES

Type	Quantity	Addressable or Conventional	Alarm or Supervisory	Sensing Technology
Manual Pull Stations				
Smoke Detectors				
Duct Smoke Detectors				
Heat Detectors				
Gas Detectors				
Waterflow Switches				
Tamper Switches				

9. NOTIFICATION APPLIANCES

Type	Quantity	Description
Audible		
Visible		
Combination Audible and Visible		

10. SYSTEM CONTROL FUNCTIONS

Type	Quantity
Hold-Open Door Releasing Devices	
HVAC Shutdown	
Fire/Smoke Dampers	
Door Unlocking	
Elevator Recall	
Elevator Shunt Trip	

11. INTERCONNECTED SYSTEMS

☐ This system does not have interconnected systems.

☐ Interconnected systems are listed on supplementary sheet _____ .

12. CERTIFICATION AND APPROVALS

12.1 System Installation Contractor

This system as specified herein has been installed according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

12.2 System Operational Test

This system as specified herein has tested according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

12.3 Acceptance Test

Date and time of acceptance test: _____

Installing contractor representative: _____

Testing contractor representative: _____

Property representative: _____

AHJ representative: _____

EMERGENCY COMMUNICATIONS SYSTEMS
SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It includes systems and components specific to emergency communications systems.
This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. DESCRIPTION OF SYSTEM OR SERVICE

☐ Fire alarm with in-building fire emergency voice alarm communication system (EVAC)

☐ Mass notification system

☐ Combination system, with the following components:

☐ Fire alarm ☐ EVACS ☐ MNS ☐ Two-way, in-building, emergency communications system

☐ Other (specify): _____

NFPA 72 edition: _____ Additional description of system(s): _____

2.1 In-Building Fire Emergency Voice Alarm Communications System

Manufacturer: _____ Model number: _____

Number of single voice alarm channels: _____ Number of multiple voice alarm channels: _____

Number of speakers: _____ Number of speaker circuits: _____

Location of amplification and sound processing equipment:

_____

Location of paging microphone stations:

Location 1: _____

Location 2: _____

Location 3: _____

2.2 Mass Notification System

2.2.1 System Type:

☐ In-building MNS–combination

☐ In-building MNS ☐ Wide-area MNS ☐ Distributed recipient MNS

☐ Other (specify): _____

2. DESCRIPTION OF SYSTEM OR SERVICE *(continued)*

2.2.2 System Features:

☐ Combination fire alarm/MNS ☐ MNS autonomous control unit ☐ Wide-area MNS to regional national alerting interface

☐ Local operating console (LOC) ☐ Distributed-recipient MNS (DRMNS) ☐ Wide-area MNS to DRMNS interface

☐ Wide-area MNS to high power speaker array (HPSA) interface ☐ In-building MNS to wide-area MNS interface

☐ Other (specify): _____

2.2.3 MNS Local Operating Consoles

Location 1: _____

Location 2: _____

Location 3: _____

2.2.4 High Power Speaker Arrays

Number of HPSA speaker initiation zones: _____

Location 1: _____

Location 2: _____

Location 3: _____

2.2.5 Mass Notification Devices

Combination fire alarm/MNS visual devices: _____ MNS-only visual devices: _____

Textual signs: _____ Other (describe): _____

Supervision class: _____

2.2.6 Special Hazard Notification

☐ This system does not have special suppression predischarge notification.

☐ MNS systems DO NOT override notification appliances required to provide special suppression predischarge notification.

3. TWO-WAY EMERGENCY COMMUNICATIONS SYSTEMS

3.1 Telephone System

Number of telephone jacks installed: _____ Number of warden stations installed: _____

Number of telephone handsets stored on site: _____

Type of telephone system installed: ☐ Electrically powered ☐ Sound powered

3.2 Two-Way Radio Communications Enhancement System

Percentage of area covered by two-way radio service: Critical areas _____ % General building areas _____ %

Amplification component locations: _____

Inbound signal strength _____ dBm Outbound signal strength _____ dBm

Donor antenna isolation is _____ dB above the signal booster gain.

Radio frequencies covered: _____

Radio system monitor panel location: _____

3. TWO-WAY EMERGENCY COMMUNICATIONS SYSTEMS *(continued)*

3.3 Area of Refuge (Area of Rescue Assistance) Emergency Communications Systems

Number of stations: _____ Location of central control point: _____

Days and hours when central control point is attended: _____

Location of alternate control point: _____

Days and hours when alternate control point is attended: _____

3.4 Elevator Emergency Communications Systems

Number of elevators with stations: _____ Location of central control point: _____

Days and hours when central control point is attended: _____

Location of alternate control point: _____

Days and hours when alternate control point is attended: _____

3.5 Other Two-Way Communications System

Describe: _____

4. CONTROL FUNCTIONS

This system activates the following control functions specific to emergency communications systems:

Type	Quantity
Mass Notification Override of Alarm Signaling Systems or Appliances	

See Main System Record of Completion for additional information, certifications, and approvals.

POWER SYSTEMS
SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It includes systems and components specific to power systems that incorporate generators, UPS systems, remote battery systems, or other complex power systems. This form is to be completed by the system installation contractor at the time of system acceptance and approval. It shall be permitted to modify this form as needed to provide a more complete and/or clear record. Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. SYSTEM POWER

2.1 Control Unit

2.1.1 Primary Power

Input voltage of control panel: _____ Control panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panelboard): _____

Disconnecting means location: _____

2.1.2 Engine-Driven Generator

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

2.1.3 Uninterruptible Power System

Equipment powered by UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.1.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.2 In-Building Fire Emergency Voice Alarm Communications System or Mass Notification System

2.2.1 Primary Power

Input voltage of EVACS or MNS panel: _____ EVACS or MNS amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panelboard): _____

Disconnecting means location: _____

2. SYSTEM POWER *(continued)*

2.2.2 Engine-Driven Generator

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

2.2.3 Uninterruptible Power System

Equipment powered by UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.2.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.3 Notification Appliance Power Extender Panels

☐ This system does not have power extender panels.

2.3.1 Primary Power

Input voltage of power extender panel(s): _____ Power extender panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panelboard): _____

Disconnecting means location: _____

2.3.2 Engine-Driven Generator

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

2.3.3 Uninterruptible Power System

Equipment powered by UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.3.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

See Main System Record of Completion for additional information, certifications, and approvals.

NOTIFICATION APPLIANCE POWER PANEL
SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It includes a list of types and locations of notification appliance power extender panels.
This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. NOTIFICATION APPLIANCE POWER EXTENDER PANELS

Make and Model	Location	Area Served	Power Source

See Main System Record of Completion for additional information, certifications, and approvals.

INTERCONNECTED SYSTEMS
SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It includes a list of types and locations of systems that are interconnected to the main system.
This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. INTERCONNECTED SYSTEMS

Description	Location	Purpose

See Main System Record of Completion for additional information, certifications, and approvals.

DEVIATIONS FROM ADOPTED CODES AND STANDARDS
SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It enables the designer and/or installer to document and justify deviations from accepted codes or standards.
This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. DEVIATIONS FROM ADOPTED CODES OR STANDARDS

Description	Purpose

See Main System Record of Completion for additional information, certifications, and approvals.

SYSTEM RECORD OF INSPECTION AND TESTING

This form is to be completed by the system inspection and testing contractor at the time of a system test.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.
Attach additional sheets, data, or calculations as necessary to provide a complete record.

Inspection/Test Start Date/Time: _____ Inspection/Test Completion Date/Time: _____

Supplemental Form(s) Attached: _____ (yes/no)

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

Description of property: _____

Name of property representative: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

2. TESTING AND MONITORING INFORMATION

Testing organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Monitoring organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Account number: _____ Phone line 1: _____ Phone line 2: _____

Means of transmission: _____

Entity to which alarms are retransmitted: _____ Phone: _____

3. DOCUMENTATION

On-site location of the required record documents and site-specific software: _____

4. DESCRIPTION OF SYSTEM OR SERVICE

4.1 Control Unit

Manufacturer: _____ Model number: _____

4.2 Software and Firmware

Firmware revision number: _____

4.3 System Power

4.3.1 Primary (Main) Power

Nominal voltage: _____ Amps: _____ Location: _____

Overcurrent protection type: _____ Amps: _____ Disconnecting means location: _____

4. DESCRIPTION OF SYSTEM OR SERVICE *(continued)*

4.3.2 Secondary Power

Type: _____ Location: _____

Battery type (if applicable): _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

5. NOTIFICATIONS MADE PRIOR TO TESTING

Monitoring organization	Contact:	_____	Time:	_____
Building management	Contact:	_____	Time:	_____
Building occupants	Contact:	_____	Time:	_____
Authority having jurisdiction	Contact:	_____	Time:	_____
Other, if required	Contact:	_____	Time:	_____

6. TESTING RESULTS

6.1 Control Unit and Related Equipment

Description	Visual Inspection	Functional Test	Comments
Control unit	☐	☐	
Lamps/LEDs/LCDs	☐	☐	
Fuses	☐	☐	
Trouble signals	☐	☐	
Disconnect switches	☐	☐	
Ground-fault monitoring	☐	☐	
Supervision	☐	☐	
Local annunciator	☐	☐	
Remote annunciators	☐	☐	
Remote power panels	☐	☐	
	☐	☐	

6.2 Secondary Power

Description	Visual Inspection	Functional Test	Comments
Battery condition	☐	☐	
Load voltage	☐	☐	
Discharge test	☐	☐	
Charger test	☐	☐	
Remote panel batteries	☐	☐	

6. TESTING RESULTS *(continued)*

6.3 Alarm and Supervisory Alarm Initiating Device

Attach supplementary device test sheets for all initiating devices.

6.4 Notification Appliances

Attach supplementary appliance test sheets for all notification appliances.

6.5 Interface Equipment

Attach supplementary interface component test sheets for all interface components.

Circuit Interface / Signaling Line Circuit Interface / Fire Alarm Control Interface

6.6 Supervising Station Monitoring

Description	Yes	No	Time	Comments
Alarm signal	☐	☐		
Alarm restoration	☐	☐		
Trouble signal	☐	☐		
Trouble restoration	☐	☐		
Supervisory signal	☐	☐		
Supervisory restoration	☐	☐		

6.7 Public Emergency Alarm Reporting System

Description	Yes	No	Time	Comments
Alarm signal	☐	☐		
Alarm restoration	☐	☐		
Trouble signal	☐	☐		
Trouble restoration	☐	☐		
Supervisory signal	☐	☐		
Supervisory restoration	☐	☐		

7. NOTIFICATIONS THAT TESTING IS COMPLETE

Monitoring organization	Contact:	_____	Time:	_____
Building management	Contact:	_____	Time:	_____
Building occupants	Contact:	_____	Time:	_____
Authority having jurisdiction	Contact:	_____	Time:	_____
Other, if required	Contact:	_____	Time:	_____

8. SYSTEM RESTORED TO NORMAL OPERATION

Date: _____ Time: _____

9. CERTIFICATION

This system as specified herein has been inspected and tested according to NFPA 72, 2013 edition, Chapter 14.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

Qualifications (refer to 10.5.3): _____

10. DEFECTS OR MALFUNCTIONS NOT CORRECTED AT CONCLUSION OF SYSTEM INSPECTION, TESTING, OR MAINTENANCE

_____

_____

_____

_____

_____

_____

_____

10.1 Acceptance by Owner or Owner's Representative:

The undersigned accepted the test report for the system as specified herein:

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

NOTIFICATION APPLIANCE
SUPPLEMENTARY RECORD OF INSPECTION AND TESTING

This form is a supplement to the System Record of Inspection and Testing.
It includes a notification appliance test record.
This form is to be completed by the system inspection and testing contractor at the time of the inspection and/or test.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Inspection/Test Start Date/Time: _____ Inspection/Test Completion Date/Time: _____

Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. NOTIFICATION APPLIANCE TEST RESULTS

Appliance Type	Location/Identifier	Test Results

NOTIFICATION APPLIANCE
SUPPLEMENTARY RECORD OF INSPECTION AND TESTING *(continued)*

2. NOTIFICATION APPLIANCE TEST RESULTS *(continued)*

Appliance Type	Location/Identifier	Test Results

See main System Record of Inspection and Testing for additional information, certifications, and approvals.

SECTION 31 1000

SITE CLEARING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Removal of vegetation, grass, grass roots, shrubs, tree stumps, trees, upturned stumps, weed growth, tree roots, brush, masonry, concrete, rubbish, debris and other materials.

2. Removal of concrete and bituminous surfaces.

3. Removal of existing fences and gates.

B. Related Requirements:

1. Section 31 2200 - Grading.

2. Section 31 2313 - Excavation and Fill.

3. Section 31 2319 - Excavation and Fill for Structures.

4. Section 31 2323 - Excavation and Fill for Utilities.

5. Section 31 2326 - Base Course.

1.02 SUBMITTALS

A. Shop Drawings: Submit site plan indicating extent of site clearing.

1.03 QUALITY ASSURANCE

A. Comply with Standard Specifications for Public Works Construction, current edition, as a minimum requirement.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 TREE AND STUMP REMOVAL

A. Remove trees and stumps indicated or required to be removed. Remove trees, together with bulk of roots, to a minimum depth of 4 feet below required grade, and within a radius of approximately 7 feet beyond perimeter of trunk at grade.

B. Fill and compact excavation from tree and stump removal. Fill in 6 inch layers, each compacted to 90 percent of maximum density in accordance with ASTM D1557.

1. Back filling shall not commence until the excavation is inspected and tested.

3.02 CONCRETE AND BITUMINOUS SURFACING REMOVAL

A. Break up and completely remove existing concrete surfacing, curbs, gutters, walks and bituminous surfacing to indicated limits. Cutting shall be performed to a neat and even line with proper tools or a concrete cutting saw. Minimum depth of cut shall be 1 1/2-inch, unless otherwise indicated. Remove concrete broken beyond the indicated limits to the nearest joint or score line and replace with new concrete to match existing.

3.03 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 31 2200

GRADING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. General exterior grading, cutting and filling, including grading for building area, paving, planting areas, banks and hillsides.

B. Related Requirements:

1. Section 31 1000 - Site Clearing.

2. Section 31 2313 - Excavation and Fill.

3. Section 31 2319 - Excavation and Fill for Structures.

4. Section 31 2323 - Excavation and Fill for Utilities.

5. Section 31 2326 - Base Course.

1.02 PROJECT REQUIREMENTS

A. General:

1. Fees: Pay as required by authorities having jurisdiction over the area.

2. Bonds: Post as required by authorities having jurisdiction over the area.

3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

4. Before grading, contact Underground Service Alert of Southern California (USASC) for information on public buried utilities and pipelines. Retain the services of an underground utility locator for on-site utilities.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall conform to requirements specified in this and related sections.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect and maintain installed stakes until their removal is required for the Work. Provide replacement grade or location stakes lost or disturbed.

B. Install grade stakes and compare to indicated grades. If discrepancies are found between existing grades and grades indicated on Drawings, do not proceed until discrepancies are resolved.

3.02 ROUGH AND FINE GRADING

A. Rough grade area sufficiently high to require cutting by fine grading:

1. Grade area for bituminous surfacing and other paving to the indicated grades, equal to the section of the indicated base and pavement.

2. Slope banks to required finish grades as cut progresses or leave cuts full and finish grade by mechanical equipment to provide grades and soil densities indicated on the Drawings.

3. Rough grade, fill and compact banks beyond indicated finish grades. Finish grade banks and slopes to indicated grades and specified soil densities.

4. Grade Only Areas: In areas not indicated to receive pavement, rough grade to approximate finish grades and then scarify, moisten and roll to obtain required density and indicated finish grades.

5. Tolerances: Finish grades shall be within a tolerance of 0.05 inch per foot above or below grades indicated. Provide an average grade as indicated.

B. Base or Subgrade:

1. After subgrade has been constructed to approximate required grades, scarify to a depth of at least 6 inches:

a. After scarifying, process loosened material to a finely divided condition and adjust moisture content to optimum condition by addition of water, addition and blending of dry suitable material, or by drying of existing material.

b. Subgrade material shall be compacted by tamping, sheepsfoot rollers or pneumatic tire rollers. Required relative compaction shall be 95 percent minimum for the top 6 inches below subgrade.

c. Install base course in accordance with Section 31 2326 - Base Course.

2. Tolerance of completed grades of base or subgrade shall not vary more than 0.03 inch per foot from grades indicated. Provide an average grade as indicated.

3.03 SHORING

A. Provide shoring as necessary to properly and safely support earth sides of excavations, and existing curbs, sidewalks, gutter, drives and stairs, against movement and collapse.

B. Design and Calculations: Provide in accordance with requirement of CalOHSA.

C. Remove shoring upon completion of the Work of this section or when no longer needed unless required otherwise by authorities having jurisdiction.

3.04 EXCESS MATERIAL DISPOSAL

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 31 2313

EXCAVATION AND FILL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Excavating, filling, backfilling, and compacting for Project site pavement, planting areas, buildings, and other structures.

2. Trenches for utility lines such as water, gas, irrigation, storm drain and sewer lines, concrete-encased conduits, manholes, vaults, valve boxes, catch basins, underground tanks, thrust blocks, yard boxes, pull boxes, and other utility appurtenances.

B. Related Requirements:

1. Section 01 4524 - Environmental Import/Export Materials Testing.
2. Section 31 1000 - Site Clearing.
3. Section 31 2200 - Grading.
4. Section 31 2326 - Base Course.
5. Section 32 1313 - Site Concrete Work.
6. Section 33 1100 - Site Water Distribution Utilities.
7. Section 33 3000 - Site Sanitary Sewer Utilities.
8. Section 33 4000 - Storm Drainage Utilities.

1.02 PROJECT REQUIREMENTS

A. Import and Export of Earth Materials:

1. Fees: Pay as required by authorities having jurisdiction over the area.

2. Bonds: Post as required by authorities having jurisdiction over the area.

3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.03 SUBMITTALS

A. Shoring calculations as required in Article 3.03 of this Section.

1.04 QUALITY ASSURANCE

A. Comply with the Standard Specifications for Public Works Construction, current edition, except as modified herein.

B. Sampling, testing, and certification of imported and exported soils shall be performed in accordance with Section 01 4524, Environmental Import/Export Materials Testing.

1.05 TESTING

A. OWNER will retain a Geotechnical Engineer as an OWNER Consultant who will provide observations, tests, inspections and approvals identified in the Contract Documents as being responsibility of OWNER.

B. Imported Soils: The Geotechnical Engineer will obtain initial product Sample for testing in accordance Article 3.05 of this Section.

1.06 PROJECT CONDITIONS

A. Information on Drawings or in soil investigation report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

PART 2 - PRODUCTS

2.01 FILL AND BACKFILL MATERIALS

A. Fill and backfill material shall be a granular material previously removed from excavation or imported fill material, free of clods and stones larger than 3 inches, (2½ inches for utility trenches) foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.

B. Fill material exhibiting a wide variation in consistency and moisture content shall be blended and aerated to stabilize and upgrade the material.

C. Bedding material from trench bottom to one foot above the pipe:

1. Sand, gravel, crushed aggregate or native free-draining granular material providing a sand equivalent of at least 30 or a coefficient of permeability greater than 1.4 inches per hour.

2. Sand complying with the Specifications for cement concrete aggregates.

D. Brick rubble and broken concrete originating from the Project site shall be legally disposed of off the Project site No such material shall be imported from outside the Project site.

E. Permeable Backfill:

1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

Sieve Size:	Percentage Passing:
3/4 inch (19mm)	100
3/8 inch (10mm)	80 to 100
No. 100	0 to 8
No. 200	0 to 3

2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.

3. Provided backing for weep-holes shall consist of two cubic feet of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.

4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system Miradrain by Mirafi, Inc., American Wick Drain, JDR Enterprises, or equal, may be provided if reviewed and approved by the ARCHITECT.

F. Cement-sand slurry shall be provided with one sack of cement per cubic yard of the mixture.

2.02 BASE MATERIALS

A. Concrete Slabs on Grade: Provide "Crushed Aggregate Base" as specified in Standard Specifications for Public Works Construction, Section 200 - Rock Materials, with 3/4 inch maximum size aggregates. Provide 3 inch thick base, unless noted otherwise.

B. Bituminous Surfacing: Provide as indicated on Drawings and specified in Section 31 2326 Base Course.

PART 3 - EXECUTION

3.01 GENERAL

A. Before initiating intrusive activities, contact Underground Service Alert of Southern California (USA or Dig Alert) to obtain a Dig Alert ticket for location information on buried public and USA member utilities and pipelines at least 48-hours prior to beginning work. A copy of the Dig Alert ticket shall be forwarded to the OWNER. For on-site utilities, retain a state-licensed third party underground utility locating service.

B. Where the work includes a building extension or addition on an occupied project site, perform work in such a manner, and at such times, as not to disrupt performance of existing utility services to existing project site facilities. Where an interruption is necessary, obtain review from the OAR before proceeding.

C. Remove concrete or bituminous pavement to straight lines by saw cutting.

3.02 PROTECTION

A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, OSHA regulations.

B. Protect existing improvements including landscaping against damage. Repair or replace damaged items.

C. Protect existing utility services and distribution systems from damage or displacement.

D. Remove conduits or pipes not in service, exposed during Work, unless a minimum cover of two feet is provided. Remove concrete, clay or other non-metallic pipe over 8 inches in diameter, unless otherwise indicated.

E. Shore, crib, or lag excavations and earthen banks as necessary to prevent cave in, erosion or gullying of sides.

F. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. If soil becomes soft, soggy, or saturated, excavate to firm undisturbed earth and fill as required. Slope adjacent grades away from excavations to minimize entry of water.

3.03 SHORING

A. Provide shoring as necessary to properly and safely support earth sides of excavations, and existing curbs, sidewalks, gutter, drives and stairs, against movement and collapse.

B. Design and Calculations: Provide in accordance with requirement of governing Cal-OSHA requirements.

C. Remove shoring upon completion of the work of this section or when no longer needed unless required otherwise by authorities having jurisdiction.

3.04 EXCAVATION

A. Unclassified Excavations: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork", except as modified herein.

B. Form sides of footings, pads, grade beams, and slab foundations, unless otherwise indicated. Provide excavations of sufficient size to permit installation and removal of forms and other required work.

C. Machine-drill excavation for round footings to size and depth indicated. Provide a collar or casing, or other adequate protection, to exclude dirt and debris. Protect excavations with plank covers until concrete is placed.

D. Provide excavation bottoms level and free from loose material. Excavate to indicated or required elevations of undisturbed earth.

E. Trenches over five feet in depth shall comply with the Construction Safety Orders of the California Division of Industrial Safety.

F. Where indicated or required to excavate in lawn areas, protect adjoining lawn areas outside of the work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns.

G. For Structures:

1. Calculate excavation quantities based on elevations or depths indicated on Drawings.

2. Provide 2,000 psi concrete for backfill of over-excavated areas to indicated or required elevations.

3. Special preparation of bottom of excavated planes areas: Excavate areas shown on drawings as bottom of excavated planes (B.E.P.), by excavating and filling to indicated grades and elevations.

H. For Utilities:

1. Excavate trenches to required depth for utility lines, such as pipes, conduits, and tanks, with minimum allowance of 6 inches at the bottom and 6 inches at the sides for bedding or concrete encasement as indicated on drawings. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before placing sand bedding or concrete encasement.

2. Do not install piping lengthwise under concrete walks without review by the ARCHITECT.

3. Do not excavate trenches parallel to footings closer than 18 inches from the face of the footing or below a plane having a downward slope of two horizontal to one vertical, from a line 9 inches above bottom of footings.

   a. Unless otherwise indicated on Drawings, depth of excavations outside buildings shall provide for a minimum coverage above top of piping, tank or conduit measured from the lowest adjoining finished grade, as follows:

Steel Pipe	24 inches below finish grade
Copper Water Tube	18 inches below finish grade
Cast-Iron, Pressure Pipe	36 inches below finished grade
Plastic Pipe (other than waste)	30 inches below finished grade
Tanks or other structure	36 inches below finished grade
Soil, sewer and storm drain	minimum 18 inches below finished grade, and as required for proper pitch and traffic load. Install polypropylene sewer pipe with at least 24 inches of coverage.
Irrigation Pipe:	Non-pressure pipe - 12 inches, pressure pipe - 24 inches.

   b. Trench width shall provide space for fitting and joining. Excavate for piping bells and fittings, bell and spigot pipe and other fittings.

4. Where portions of existing structures, walks, paving, or other improvements are removed or cut for piping or conduit installation, replace the material with equal quality, finished to match adjoining existing improvements.

5. Provide a minimum clear dimension of 2 inches from sides of wall excavation to outer surfaces of buried pipes or conduits placed in the same trench or outside surfaces of containers and tanks.

3.05 IMPORT/EXPORT OF MATERIALS

A. Unclassified Fill and Compaction: Comply with the Standard Specifications for Public Works Construction, Section 300 - Earthwork, except as modified herein. Install and compact fill in layers not to exceed 6 inches in thickness.

B. Provide fill materials as specified in Part 2- Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.

C. In addition to the requirements of this section, import and/or exported materials shall comply with the requirements of Section 01 4524, Environmental Import/Export Materials Testing.

D. Imported fill materials shall be sampled by the Geotechnical Engineer, for compliance with the requirements of part 2 of this section.

E. The Geotechnical Engineer, will submit the samples to an independent DSA approved testing laboratory for testing.

F. Initial sampling and testing shall be performed before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and entity responsible for the source site. The Geotechnical Engineer, will obtain both the initial and additional samples from the identified site and submit samples for required testing.

G. The Geotechnical Engineer will perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1000 cubic yards of material, one sample shall be obtained and submitted for testing for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.

H. The independent approved testing laboratory will perform the required tests and report results of tests noting if the tested material passed or failed such tests and will furnish copies to the Project Inspector, ARCHITECT, OAR, DSA, CONTRACTOR, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, California Building Code, and the DSA. Upon completion of the Work of this Section, the independent testing laboratory and Geotechnical Engineer will submit a verified report to the DSA as required by the CBC.

I. Bills of lading or equivalent documentation will be submitted to the Project Inspector on a daily basis.

J. Upon completion of import operations, provide the OAR a certification statement attesting that imported material has been obtained from the identified source site.

3.06 INSTALLATION OF MATERIALS

A. Pavement: Fill or backfill materials shall be installed in horizontal layers of 6 inches, unless otherwise required. Each layer shall be evenly placed and moistened or aerated as necessary. Unless otherwise reviewed by the Geotechnical Engineer, each layer of fill material shall cover the length and width of the area to be filled before the next layer of material is installed. Top surface of each layer shall be installed to an approximate level with a crown or crossfall of at least 1 in 50, but not more than 1 in 20. Provide adequate drainage at all times during installation of the Work of this Section.

B. Structures:

1. After concrete has been placed, forms removed, and concrete work inspected, backfill excavations with earth to indicated or required grades. Backfill simultaneously on each side of walls or grade beams. Remove rubbish, debris and other waste materials from excavations before placing backfill.

2. Before placing backfill, adequately cure concrete and provide bracing, if required to stabilize structure. Protect waterproofing or damp-proofing against damage during backfilling operations, with required protection board. Remove bracing as backfill operation progresses.

3. Do not furnish or install expansive soils for retaining wall backfill.

4. Rigidly control the amount of water to be installed to provide optimum moisture content for type of fill material furnished. Do not over-saturate or compact by flooding or jetting.

5. Install wall backfill before installing railings and fences on walls.

6. Install weep hole drainage at the backside of walls so the backing completely covers the weep holes, is horizontally centered and extends at least 12 inches above the bottom of the weep opening. Provide an 8-inch square section of 1/4 inch galvanized or aluminum screen, with a minimum wire diameter of 0.03 inch, and install at the backside of each weep hole before installing the backfill material.

7. Where a reviewed drainage matting system is provided instead of permeable backfill for retaining structures, install in accordance with the manufacturer recommendations.

C. Utilities:

1. Do not install backfill until the work of this section has been inspected and tested. Do not furnish or install materials excavated from the project site containing materials not permitted for backfill.

2. Backfill electrical or other excavated utility trenches located outside of barricaded installation areas within 24 hours after inspection by the IOR.

3. Install backfill in layers not exceeding 4 inches in thickness, except cement-sand slurry.

4. If materials excavated from the project site are not permitted for trench backfill in paved areas, backfill trenches with a cement-sand slurry mix. Install backfill to an elevation of the existing undisturbed grades plus one inch.

3.07 COMPACTING

A. Each layer of fill material shall be compacted by tamping, sheepsfoot rollers, or pneumatic-tired rollers to provide specified relative compaction. At inaccessible locations, provide specified compaction by manually held, operated and directed compaction equipment.

B. Install and compact sand bedding to provide a uniform bearing under the full length of piping and conduits.

C. Unless otherwise indicated, compact each layer of fill material to a relative compaction of at least ninety-five (95) percent.

D. When fill materials, or a combination of fill materials, are encountered or provided which develop densely packed surfaces as a result of installation or compacting operations, scarify each layer of compacted fill before installing the next succeeding layer.

3.08 INSPECTION AND TESTING

A. The Geotechnical Engineer will inspect and test excavations, sample material quality for testing as set required in Part 2, and observe installation and compaction of fill materials.

B. The Geotechnical Engineer will sample imported fill materials from their designated source and submit samples to the independent approved testing laboratory before delivery to the Project site.

C. Installation of backfill shall be observed by the Geotechnical Engineer.

D. The Geotechnical Engineer will inspect and test excavation work before the installation of fill and other materials.

E. Compaction: Test compaction in accordance with ASTM D1557, Method C.

F. The Project Inspector will inspect foundation excavations when completed and ready for forms, after forms are in place, and before first placement of concrete.

3.09 PROTECTION

A. Protect the work of this section until substantial completion.

3.10 CLEANING

A. Remove rubbish, debris, and waste materials and legally dispose of off the project site.

END OF SECTION

SECTION 31 2319

EXCAVATION AND FILL FOR STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Excavating, backfilling, and compacting for buildings and structures.

2. Fill materials.

B. Related Requirements:

1. Section 01 4524 - Environmental Import/Export Materials Testing.

2. Section 31 1000 - Site Clearing.

3. Section 31 2200 - Grading.

4. Section 31 2616 - Excavation and Fill for Paving.

5. Section 31 2323 - Excavation and Fill for Utilities.

1.02 PROJECT REQUIREMENTS

A. Import and Export of Earth Materials:

1. Fees: Pay as required by authorities having jurisdiction over the area.

2. Bonds: Post as required by authorities having jurisdiction over the area.

3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.03 SUBMITTALS

A. Imported Soils: A Geotechnical Engineer, retained by the Owner as an Owner Consultant, will obtain initial product Sample for testing in accordance with the terms of article 3.05 of this section.

B. Shoring calculations as required in Article 3.03 of this section.

1.04 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition, except as modified herein.

B. Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 01 4524 - Environmental Import/Export Materials Testing.

1.05 TESTING

A. OWNER will retain a Geotechnical Engineer as an OWNER consultant who will provide observations, tests, inspections and approvals identified in the contract documents as being responsibility of OWNER.

B. Imported Soils: The Geotechnical Engineer will obtain initial product sample for testing in accordance Article 3.05 of this Section.

1.06 PROJECT CONDITIONS

A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

PART 2 - PRODUCTS

2.01 FILL AND BACKFILL MATERIALS

A. Fill and backfill materials shall be a granular material previously removed from excavation, or imported fill material, free of large clods and stones larger than 3 inches, foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.

B. Fill material exhibiting a wide variation in consistency and or moisture content shall be blended and/or aerated to stabilize and upgrade the material.

C. Imported Fill Material:

1. Provide suitable materials obtained from project site excavations for earthwork and fill materials. If excavated materials are not of suitable quality or sufficient quantity, import additional materials as necessary.

2. Imported fill shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing 200 mesh sieve. Material shall have a coefficient of expansion of not more than two percent from air dry to optimum moisture content and not more than six percent from air dry to saturation. Imported material shall be clean and free of rubbish, debris and toxic or hazardous contaminants. Adobe or clay soils are not permitted.

D. Brick rubble and broken concrete originating from the Project site shall be legally disposed of off the Project site No such materials shall be imported from outside the Project site.

E. Permeable Backfill:

1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

Sieve Size	Percentage Passing
3/4 inch	100

3/8 inch	80 to 100
No. 100	0 to 8
No. 200	0 to 3

2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.

3. Provided backing for weep-holes shall consist of two cubic feet of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.

4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system, Miradrain by Mirafi, Inc., or equal, may be provided if reviewed and approved by the ARCHITECT.

PART 3 - EXECUTION

3.01 GENERAL

A. Before initiating intrusive activities, contact Underground Service Alert of Southern California (USA or Dig Alert) to obtain a Dig Alert ticket for location information on buried public and USA member utilities and pipelines at least 48-hours prior to beginning work. A copy of the Dig Alert ticket shall be forwarded to the OWNER. For on-site utilities, retain a state-licensed third party underground utility locating service.

B. Clear the Project site as indicated in Section 31 1000 - Site Clearing.

3.02 PROTECTION

A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, Cal-OSHA regulations.

B. Protect adjacent existing improvements including landscaping against damage.

C. Shore, crib, or lag excavations and earthen banks as necessary to prevent caving-in, erosion or gullying of sides.

D. Divert or de-water excavations until concrete is placed, forms are removed, and backfilling is complete.

3.03 SHORING

A. Provide shoring as necessary to properly and safely support earth sides of excavations, curbs, sidewalks, gutter, drives and stairs, against movement and collapse.

B. Design and Calculations: Provide in accordance with requirement of Cal-OHSA. Remove shoring upon completion of Work, or when no longer needed.

3.04 EXCAVATION

A. Form sides of footings, pads, grade beams, and slab foundations, unless otherwise indicated. Provide excavations of sufficient size to permit installation and removal of forms and other Work as required.

B. Machine-drill excavation for round footings to size and depth indicated. Provide a collar or casing, or other adequate protection, to exclude dirt and debris. Protect excavations with plank covers until concrete is placed.

C. Provide excavation bottoms level and free from loose material. Excavate to indicated or required elevations of undisturbed earth.

D. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. If soil becomes soft, soggy, or saturated, excavate to firm undisturbed soil and fill as required. Slope adjacent grades away from excavations to minimize entry of water.

E. Calculate excavation quantities based on elevations or depths indicated on Drawings.

F. Provide 2,000 psi concrete for backfill of over-excavated areas to indicated or required elevations.

G. Special preparation of bottom of excavated planes areas: Excavate areas designated on Drawings as bottom of excavated planes (B.E.P.), by excavating and filling to indicated grades and elevations.

3.05 IMPORT/EXPORT OF MATERIALS

A. Provide fill materials as specified in Part 2- Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.

B. In addition to the requirements of this Section, import and/or exported materials shall comply with the requirements of Section 01 4524 - Environmental Import/Export Materials Testing.

C. Imported fill materials will be sampled by the Geotechnical Engineer for compliance with the requirements of Part 2 of this section.

D. The geotechnical engineer will submit all samples to a DSA approved independent testing laboratory for testing.

E. Initial sampling will be performed by the Geotechnical Engineer before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and/or entity responsible for the source site. The Geotechnical Engineer will obtain both the initial sample and additional samples from the identified site and will submit samples to the approved independent testing laboratory for testing.

F. The Geotechnical Engineer will perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1,000 cubic yards of material, one sample shall be obtained and submitted for testing for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1,000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.

G. The independent approved testing laboratory will perform the required tests and report results of tests noting if the tested material passed or failed such tests and will furnish copies to the Project Inspector, ARCHITECT, OAR, DSA, CONTRACTOR, and others as

required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, CBC and the DSA. Upon completion of the Work of this Section, the independent testing laboratory and Geotechnical Engineer will submit a verified report to the DSA as required by CBC.

H. Bills of lading or equivalent documentation will be submitted to the Project Inspector on a daily basis.

I. Upon completion of import operations, provide the OAR a certification statement attesting that all imported material has been obtained from the identified source site.

3.06 BACKFILLING

A. After concrete has been placed, forms removed and concrete Work inspected, backfill excavations to indicated or required grades. Backfill simultaneously on each side of walls or grade beams. Remove rubbish, debris, and other waste materials from excavations before placing backfill.

B. Before installing backfill, adequately cure concrete and provide bracing to stabilize structures. Protect waterproofing or dampproofing against damage during backfilling operations with required protection board. Remove bracing as backfill operation progresses.

C. Do not furnish or install expansive soils for below grade building walls.

D. Install each layer of material in a not to exceed thickness of 6 inches, unless otherwise required.

E. Rigidly control the amount of water to be installed to provide optimum moisture content for type of fill material furnished. Do not over-saturate or compact by flooding or jetting.

F. Install wall backfill before installing railings and fences on walls.

G. Impervious backfill materials shall be installed in layers along with and by the same methods specified for structure backfill. Impervious backfill materials shall be at the approximate grade and elevation and where exposed to erosion, shall be covered with at least a 12-inch layer of fill material as reviewed by the Geotechnical Engineer.

H. Install weep-hole drainage at the backside of walls so the backing completely covers the weep holes, is horizontally centered and extends at least 12 inches above the bottom of the weep opening. Provide an 8-inch square section of 1/4 inch galvanized or aluminum screen, with a minimum wire diameter of 0.03 inch, and install at the backside of each weep hole before installing the backfill material.

I. Where a reviewed drainage matting system is provided instead of permeable backfill for retaining structures, install in accordance with the manufacturer recommendations.

3.06 COMPACTING

A. Compact each layer of fill material by tamping, sheepsfoot rollers or pneumatic-tired rollers, to such extent as to provide specified relative compaction. At inaccessible

locations, compact to specified requirements with hand-held, operated and directed compaction equipment.

B. Unless otherwise indicated, compact each layer of fill material to a relative compaction of at least 95 percent.

C. Do not compact by flooding or jetting.

D. When fill materials, or a combination of fill materials, are encountered or provided which develop densely packed surfaces as a result of installation or compacting operations, scarify each layer of compacted fill before installing the next succeeding layer.

3.08 INSPECTION AND TESTING

A. The Geotechnical Engineer will inspect and test excavations, sample material quality as required in Part 2, and observe installation and compaction of fill materials.

B. The Geotechnical Engineer will sample imported fill materials from their designated source before delivery to the project site.

C. Installation of backfill shall be observed by the Geotechnical Engineer.

D. The Geotechnical Engineer will inspect and test excavation work before the installation of fill and/or other materials.

E. Compaction: Test compaction in accordance with ASTM D1557, Method C.

F. The Project Inspector will inspect foundation excavations when completed and ready for forms, after forms are in place and before first placement of concrete.

3.09 PROTECTION

A. Protect the work of this section until substantial completion.

3.10 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the project site.

END OF SECTION

SECTION 31 2323

EXCAVATION AND FILL FOR UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Excavating, backfilling, and compacting utility trenches such as water, gas, irrigation, storm drain, sewer lines, concrete-encased conduits, and manholes, vaults, valve boxes, catch basins, underground tanks, thrust blocks, yard boxes, pull boxes and other utility appurtenances.

B. Related Requirements:

1. Section 01 4524 - Environmental Import/Export Materials Testing.

2. Section 31 1000 - Site Clearing.

3. Section 31 2200 - Grading.

4. Section 31 2316 - Excavation and Fill for Paving.

5. Section 31 2319 - Excavation and Fill for Structures.

6. Section 32 1313 - Site Concrete Work.

7. Section 33 1100 - Site Water Distribution Utilities.

8. Section 33 3000 - Site Sanitary Sewer Utilities.

9. Section 33 4000 - Storm Drainage Utilities.

1.02 PROJECT REQUIREMENTS

A. Import and Export of Earth Materials:

1. Fees: Pay as required by authorities having jurisdiction over the area.

2. Bonds: Post as required by authorities having jurisdiction over the area.

3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.03 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications for Public Works construction, current edition except as modified herein.

B. Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 01 4524 - Environmental Import/Export Materials Testing.

1.04 TESTING

A. OWNER will retain a Geotechnical Engineer as an OWNER Consultant who will provide observations, tests, inspections and approvals identified in the Contract Documents as being responsibility of OWNER.

B. Imported Soils: The Geotechnical Engineer will obtain initial product sample for testing in accordance Article 3.02 of this Section.

1.05 PROJECT CONDITIONS

A. Information on drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the project site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Bedding material from trench bottom to one foot above the pipe:

1. Sand, gravel, crushed aggregate or native free-draining granular material providing a sand equivalent of at least 30 or a coefficient of permeability greater than 1.4 inches per hour.

2. Sand complying with the specifications for cement concrete aggregates.

B. Backfill Materials:

1. Excavated trench material to be installed for backfilling shall be clean, free of large clods, and stones larger than 2 ½-inch in any dimension.

2. Cement-sand slurry shall be provided with one sack of cement per cubic yard of the mixture.

3. Imported Fill Material: Imported fill material shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing a 200 mesh sieve. Material shall provide a coefficient of expansion of not more than two percent from air dry to optimum moisture content and not more than six percent from air dry to saturation. Imported materials shall be clean and free of rubbish, debris, and toxic or hazardous contaminants. Adobe or clay soils are not permitted.

PART 3 - EXECUTION

3.01 GENERAL

A. Before initiating intrusive activities, contact Underground Service Alert of Southern California (USA or Dig Alert) to obtain a Dig Alert ticket for location information on buried public and USA member utilities and pipelines at least 48-hours prior to beginning work.

A copy of the Dig Alert ticket shall be forwarded to the OWNER. For on-site utilities, retain a state-licensed third party underground utility locating service.

B. Saw-cut concrete or bituminous paving for trench installation.

C. Trenches over 5 feet in depth shall conform to the Cal-OSHA.

D. Where indicated and required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns.

E. Backfill over excavations to the required elevations with earth, gravel, sand, or concrete and compact as required. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. Slope adjacent grades away from excavations to minimize entry of water.

F. Do not install piping lengthwise under concrete walks without review by the ARCHITECT.

G. Do not excavate trenches parallel to footings closer than 18 inches from the face of the footing or below a plane having a downward slope of two horizontal to one vertical, from a line 9 inches above bottom of footings.

1. Unless otherwise indicated on Drawings, depth of excavations outside the buildings shall allow for a minimum coverage above top of pipe, tank, or conduit measured from the lowest adjoining finished grade, as follows:

Steel Pipe	24 inches below finished grade
Copper Water Tube	18 inches below finished grade
Cast-Iron Pressure Pipe	36 inches below finished grade
Plastic Pipe (other than waste)	30 inches below finished grade
Tanks or other structures	36 inches below finished grade
Soil, Sewer & Storm Drain	minimum 18 inches below finished grade, and as required for proper pitch and traffic load. (Install polypropylene sewer pipe with at least 24 inches coverage)
Irrigation Pipe:	nonpressure pipe 12 inches, pressure pipe 24 inches

2. Trench width shall provide ample space for fitting and joining. Excavate for piping bells and fittings, bell and spigot pipe and other fittings.

H. Unless indicated otherwise, excavate trenches to the required depths for utilities, such as pipes, conduit and tanks, with minimum allowances of 6 inches at the bottom and 6 inches at the sides for bedding of unprotected piping or as required for concrete encasement of conduits as indicated on Drawings. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before installing sand bedding or concrete encasement.

I. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. If soil becomes soft, soggy, or saturated, excavate to firm undisturbed soil and fill as required. Slope adjacent grades away from excavations to minimize entry of water.

J. Provide a minimum clear dimension of 2 inches from sides of wall excavation to outer surfaces of buried pipes or conduits installed in the same trench or outside surfaces of containers and tanks.

K. Do not install backfill until required inspections and testing is completed.

L. Backfill electrical or other excavated utility trenches located outside of barricaded installation areas within 24 hours after inspection by the Project Inspector.

M. Install backfill materials in layers not exceeding 4 inches in thickness and compact to 95 percent of the maximum density.

N. If materials excavated from the Project site are not permitted for trench backfill in paved areas, backfill trenches with a cement-sand slurry mix. Install backfill to an elevation of the existing undisturbed grade plus one inch.

O. Install and compact sand bedding to provide a uniform full length bearing under piping and conduits.

P. Where portions of existing structures, walks, paving, or other improvements are removed or cut for piping or conduit installation, replace the material with equal quality, finished to match adjoining existing improvements. Repair pavement as specified in Section 32 0117, Pavement Repair.

3.02 IMPORT/EXPORT OF MATERIALS

A. Provide fill materials as specified in Part 2, Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.

B. In addition to the requirements of this Section, import and exported materials shall comply with the requirements of Section 01 4524, Environmental Import/Export Material Testing.

C. Imported fill materials will be sampled by the Geotechnical Engineer for compliance with the requirements of Part 2 of this Section.

D. The Geotechnical Engineer will perform the tests by utilizing an independent approved testing laboratory.

E. Initial sampling will be performed by the Geotechnical Engineer before importing material to the project site. Identify the location of the source site in addition to the address, name of the person and/or entity responsible for the source site. The Geotechnical Engineer will obtain both the initial sample and additional samples from the identified site and shall submit all samples to the approved independent testing laboratory.

F. The Geotechnical Engineer will perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1,000 cubic yards of material, one sample shall be obtained and submitted for testing for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1,000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.

G. The independent approved testing laboratory will perform the required tests and report results of all tests noting if the tested material passed or failed such tests and will furnish copies to the Project Inspector, ARCHITECT, OAR, DSA, CONTRACTOR, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, CBC and the DSA. Upon completion of the Work of this Section, the independent testing laboratory and Geotechnical Engineer will submit a verified report to the DSA as required by CBC.

H. Bills of lading or equivalent documentation will be submitted to the Project Inspector on a daily basis.

I. Upon completion of import operations, provide the OAR a certification statement attesting that imported material has been obtained from the identified source site.

3.03 INSPECTION AND TESTING

A. The Geotechnical Engineer will inspect and test excavations, sample material quality as required in Part 2, observe installation and compaction of fill materials.

B. Compaction test shall be performed in accordance with ASTM D1557, method "C."

3.04 PROTECTION

A. Protect the work of this section until substantial completion.

3.05 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the project site.

END OF SECTION

SECTION 31 2326

BASE COURSE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Installation of base material.

B. Related Requirements:

1. Section 01 4524 – Environmental Import / Export Material Testing.

2. Section 31 1000 - Site Clearing.

3. Section 31 2200 - Grading.

4. Section 31 2313 - Excavation and Fill.

5. Section 31 2316 - Excavation and Fill for Paving.

6. Section 32 1313 - Site Concrete Work.

1.02 SUBMITTALS

A. Crushed aggregate base (CAB) shall consist of native rock without naturally occurring asbestos or recycled materials. The CONTRACTOR shall submit written documentation, which identifies the source, volume, and proposed transport date of the material for review and approval by OWNER'S Office of Environmental Health and Safety (OEHS) prior to importing the material. A statement on company letterhead from the CAB source, stamped by either a California Professional Geologist or Engineer, which states that the subject materials are native rock, do not contain any recycled materials and that the source quarry does not mine ultramafic materials, a source of natural occurring asbestos shall be included in the submittal to OEHS. The CONTRACTOR may request variance from analytical testing required by Section 01 4524 for CAB. To be considered for a variance, the CONTRACTOR shall submit a documentation package for OEHS approval, which includes all of the aforementioned information at least 48 hours in advance of planned import.

1. Frequently used suppliers for District projects include:

a. Hansen Aggregates.

b. Vulcan Materials, Reliance Company.

c. Vulcan Materials Durbin.

C. Product Data: Submit material source, technical information and test data for base materials. Gradation and quality certifications shall be dated within 30 days of the submittal.

D. Sample: Submit sample of proposed base course material.

1.03 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Crushed Aggregate Base (CAB) materials shall conform to the requirements of the Standard Specifications for Public Works Construction: Section 200 - Rock Materials.

B. Crushed Miscellaneous Base (CMB) or materials generated on site shall not be used as a base course material.

2.02 MATERIAL APPROVAL

A. Base material shall be inspected by the Project Inspector for gradation and material content prior to installation. The OWNER may choose to have additional tests performed by a geotechnical engineer, retained by the OWNER, before installation.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install base course material in layers not exceeding 4 inches in thickness, unless required otherwise. Grade and compact to indicated levels or grades, cut and fill, water and roll until the surface is hard and true to line, grade and required section. Provide a relative compaction of at least 95 percent, unless otherwise required.

B. Grade base course to elevations indicated on Drawings, ready to receive surfacing, in accordance with Section 31 2200 - Grading.

3.02 PROTECTION

A. Protect the Work of this section until substantial completion.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the project site.

END OF SECTION

SECTION 31-6600

SPECIFICATION FOR AGGREGATE PIER FOUNDATION SYSTEMS

PART 1 – GENERAL

1.01 Basis of Design

Work shall consist of installing Rammed Aggregate Pier foundations to the lines and grades designated on the project Geopier Rammed Aggregate Pier plans by Western Ground Improvement, or “equal”. The aggregate piers shall be constructed by either augering a cavity or driving a hollow mandrel to the design depth and vertically ramming lifts of aggregate using the specially designed tamper head and high-energy impact densification equipment to create the compacted aggregate pier. The Rammed Aggregate Pier elements shall be in a columnar-type configuration and shall be used to produce an intermediate foundation system for support of foundation loads to achieve the degree of improvement (allowable bearing capacity for maximum allowable settlements and pier modulus) as indicated in Part 3: Performance Criteria.

Substitutions shall be submitted via formal substitution request but must meet all performance requirements denoted in this specification. A reference to a specific brand or trade name established a quality standard and is not intended to limit competition. The bidder may use a product that is an “equal” to or better than the brand name or trade name if authorized. If the bidder desires to propose a “approved equal”, the bidder shall submit a request according to the construction documents.

1.02 Work Included

A. Provision of all equipment, material, labor, and supervision to install Rammed Aggregate Pier elements. Layout of Rammed Aggregate Pier elements, spoil removal (as required), footing excavations, and subgrade preparation following aggregate pier installation is not included.

B. The Rammed Aggregate Pier installation shall adhere to all methods and standards described in this Specification.

C. Drawings and General Provisions of the Contract, including General and Supplemental Conditions, and Division 1 Specifications, apply to the work in this specification. These drawings are for bid purposes only, final design of the Geopier system or approved equivalent shall be provided by the prime contractor.

1.03 Approved Installers

A. The Rammed Aggregate Pier Installer (the Installer) shall be pre-approved by the Owner’s Engineer prior to bid opening.

B. Installers must be licensed in the state of California.

C. Without exception, no alternate installer will be accepted unless approved by Owner’s Engineer.

D. Contractors of equivalent Aggregate Pier Foundation Systems shall have a minimum of 5 years of experience with the installation of such systems and shall have completed at least 15 projects. Alternative Aggregate Pier Foundation System shall meet all design, testing and performance criteria as specified herein for Rammed Aggregate Pier Foundation Systems.

E. Installers currently pre-approved for these works are (Additional installers may be submitted for approval, in accordance with these specifications by the Prime Contractor):

Foundation Service Corp., Hudson, IA
Geopier-Northwest, Inc., Bellevue, WA
Next Level Pier Foundations, Escondido, CA

1.04 Reference Standards

A. Modulus Testing

1. ASTM D 1143 - Pile Load Test Procedures
2. ASTM D 1194 - Spread Footing Load Test

B. Materials and Inspection

1. ASTM D 1241 - Aggregate Quality
2. ASTM D 422 - Gradation of Soils

C. Where specifications and reference documents conflict, the Rammed Aggregate Pier Designer shall make the final determination of the applicable document.

1.05 Certifications and Submittals

A. Modulus Test Reports – A modulus test(s) is performed on a non-production Rammed Aggregate Pier element as required by the Rammed Aggregate Pier Designer to verify the design assumptions. The Installer shall furnish the General Contractor a description of the installation equipment, installation records, complete test data, analysis of the test data and verification of the design parameter values based on the modulus test results. The report shall be prepared under direction of a Registered Professional Engineer.

B. Daily Rammed Aggregate Pier Progress Reports – The Installer shall furnish a complete and accurate record of Rammed Aggregate Pier installation to the General Contractor. The record shall indicate the pier location, length, volume of aggregate used or number of lifts, densification forces during installation, and final elevations or depths of the base and top of piers. The record shall also indicate the type and size of the installation equipment used, and the type of aggregate used. The Installer shall immediately report any unusual conditions encountered during installation to the General Contractor, to the Designer and to the Testing Agency.

PART 2: MATERIALS

2.01 Aggregate

A. Aggregate used by the Rammed Aggregate Pier Installer for pier construction shall be pre-approved by the Designer and shall demonstrate suitable performance during modulus testing. Typical aggregate consists of Type 1 Grade B in accordance with ASTM D-1241-68, No. 57 stone, recycled concrete or other graded aggregate approved by the Designer.

B. Potable water or other suitable source shall be used to increase aggregate moisture content where required. The General Contractor shall provide such water to the Installer.

PART 3: PERFORMANCE CRITERIA

3.01 Aggregate Pier Performance Requirements

A. Allowable bearing pressure for footings supported by aggregate pier reinforced soils = 6,000 psf.

B. Estimated total long-term settlement for footings including during construction and post construction: ≤ 1-inch

C. Minimum single pier stiffness modulus = 250 pci, with a top of pier stress = 12,688 psf according to section 5.02.B at 100% while ensuring the load increment has reduced deflections to less than 1/100th inch per hour within the 60min interval.

D. Single pier minimum load capacity = 39 kips.

PART 4: EXECUTION

4.01 Approved Installation Procedures

The following sections provide general criteria for the construction of the Rammed Aggregate Pier elements. Unless otherwise approved by the Designer, the installation method used for Rammed Aggregate Pier construction shall be that as used in the construction of the successful modulus test.

A. Augered Rammed Aggregate Pier systems –

1. Augered Rammed Aggregate Pier system shall be pre-augered using mechanical drilling or excavation equipment.

2. If cave-ins exceeding 10% of the lift volume occur during excavation such that the sidewalls of the hole are deemed to be unstable, steel casing shall be used to stabilize the cavity or a displacement Rammed Aggregate Pier system may be used.

3. Aggregate shall be placed in the augered cavity in lift thicknesses as determined by the Rammed Aggregate Pier Designer.

4. A specially-designed beveled tamper and high-energy impact densification apparatus shall be employed to densify lifts of aggregate during installation. The apparatus shall apply direct **downward** impact energy to each lift of aggregate.

5. The ramming energy shall not be less than 2,500 ft-lb as rated by breaker hammer manufacturers.

B. Displacement Rammed Aggregate Pier systems –

1. Displacement Rammed Aggregate Pier systems shall be constructed by advancing a specially designed mandrel with a minimum 15 ton static force augmented by dynamic vertical ramming energy to the full design depth. The hollow-shaft mandrel, filled with aggregate, is incrementally raised, permitting the aggregate to be released into the cavity, and then lowered by vertically advancing and/or ramming to densify the aggregate and force it laterally into the adjacent soil. The cycle of raising and lowering the mandrel is repeated to the top of pier elevation. The cycle distance shall be determined by the Rammed Aggregate Pier designer.

2. Special high-energy impact densification apparatus shall be employed to vertically densify the Rammed Aggregate Pier elements during installation of each constructed lift of aggregate.

3. Densification shall be performed using a mandrel/tamper. The mandrel/tamper foot is required to adequately increase the lateral earth pressure in the matrix soil during installation.

4. Downward crowd pressure shall be applied to the mandrel during installation.

4.02 Plan Location and Elevation of Rammed Aggregate Pier Elements

The as-built center of each pier shall be within 6 inches of the locations indicated on the plans. Piers installed outside of the above tolerances and deemed not acceptable shall be rebuilt at no additional expense to the Owner.

4.03 Rejected Rammed Aggregate Pier Elements

Rammed Aggregate Pier elements installed beyond the maximum allowable tolerances shall be abandoned and replaced with new piers, unless the Designer approves the condition or provides other remedial measures. All material and labor required to replace rejected piers shall be provided at no additional cost to the Owner, unless the cause of rejection is due to an obstruction or mislocation.

PART 5: QUALITY CONTROL

5.01 Control Technician

The Installer shall have a full-time, on-site Control Technician to verify and report all installation procedures. The Installer shall immediately report any unusual conditions encountered during installation to the Rammed Aggregate Pier Designer, the General Contractor, and to the Testing Agency. The quality control procedures shall include the preparation of Aggregate Pier Progress Reports completed during each day of installation containing the following information:

1. Footing and Aggregate Pier location.
2. Pre-auger diameter and soil conditions encountered during drilling.
3. Aggregate Pier length.
4. Planned and actual Aggregate Pier elevations at the top and bottom of the Aggregate Pier.
5. Average lift thickness of each Aggregate Pier.
6. Volume of aggregate used in each Aggregate Pier.
7. Documentation of any unusual conditions encountered.
8. Type and size of densification equipment used.

5.02 Rammed Aggregate Pier Modulus Test

As required by the aggregate pier design, two (2) Rammed Aggregate Pier Modulus Test(s) will be performed at the locations described on the plans to verify Rammed Aggregate Pier designs. Modulus Test Procedures shall utilize appropriate portions of ASTM D 1143 and ASTM D 1194, as outlined on plan sheet GP0.2-2 and GP0.2-1. Aggregate Piers shall be tested to 200 percent of the maximum design stress as shown in the aggregate pier design. The modulus tests shall be of the type and installed in a manner specified herein.

A. A telltale shall be installed at the bottom of the test pier so that bottom-of-pier deflections may be determined. Acceptable performance is indicated when the bottom of the pier deflection is no more than 30% of the top of pier deflection at the design stress level.

B. ASTM D-1143 general test procedures shall be used as a guide to establishing load increments, load increment duration, and load decrements. As a minimum, the following loading increments, decrements and duration shall be used.

Increment	Approximate Load (percent design)	Minimum Duration (min)	Maximum Duration (min)
Seat	< 5	0	N/A
1	25	15	60
2	50	15	60
3	75	15	60
4	100	15	60
5	125	60	240
6	150	15	60
7	175	15	60
8	200	15	60
9	150	N/A	N/A
10	100	N/A	N/A
11	50	N/A	N/A
12	25	N/A	N/A
13	0	N/A	N/A

C. With the exception of the load increment representing approximately 125% of the design maximum top of Aggregate Pier stress, all load increments shall be held for a minimum of 15 minutes. Loads are then maintained until the rate of deflection reduces to 0.01 inch per hour or for the maximum of 1 hour, whichever is occurs first.

D. The load increment that represents approximately 125% of the design maximum stress on the Aggregate Pier shall be held for a minimum of 60 minutes. Loads are then maintained until the rate of deflection reduces to 0.01 inch per hour or for the maximum of 4 hours, whichever is occurs first.

E. A seating load equal to 5 percent of the total load shall be applied to the loaded steel plate prior to application of load increments and prior to measurement of deflections to compensate for surficial disturbance.

F. Deflections of each plate shall be measured using a minimum of two dial gauges graduated to 0.001 inches.

G. The test jack, pump and pressure gauges shall have been calibrated within no longer than six months from the date of the test.

H. The results of the modulus test shall be reported on a deflection versus stress graph. The aggregate pier modulus shall be calculated as the maximum design stress divided by the deflection of the top plate at the maximum design stress.

5.03 Bottom Stabilization Testing (BSTs) / Crowd Stabilization Testing (CSTs)

Bottom stabilization testing (BSTs) or Crowd stabilization testing (CSTs) shall be performed by the Control Technician during the installation of the modulus test pier. The tests are performed by applying downward vertical energy to the tamper, mandrel or probe following lift construction and monitoring the amount of additional deflection from the applied energy. Additional testing as required by the Aggregate Pier Designer (typically 10% of the production Aggregate Piers) shall be performed on selected production Aggregate Pier elements to compare results with the modulus test pier.

PART 6: QUALITY ASSURANCE

6.01 Independent Engineering Testing Agency (Owner's Quality Assurance)

The Rammed Aggregate Pier Installer shall provide full-time Quality Control monitoring of

Rammed Aggregate Pier construction activities. The Owner or General Contractor is responsible for retaining an independent engineering testing firm to provide Quality Assurance services.

6.02 Responsibilities of Independent Engineering Testing Agency

A. The Testing Agency shall monitor the modulus test pier installation and testing. The Installer shall provide and install all dial indicators and other measuring devices.

B. The Testing Agency shall monitor the installation of Rammed Aggregate Pier elements to verify that the production installation practices are similar to those used during the installation of the modulus test elements.

C. The Testing Agency shall report any discrepancies to the Installer and General Contractor immediately.

D. The Testing Agency shall observe the excavation, compaction and placement of the foundations as described in Section 6.06.

PART 7: RESPONSIBILITIES OF THE GENERAL CONTRACTOR

7.01 Site Preparation and Protection

A. The General Contractor shall locate and protect underground and aboveground utilities and other structures from damage during installation of the Rammed Aggregate Pier elements.

B. Site grades for Rammed Aggregate Pier installation shall be within 1 foot of the top of footing elevation or finished grade elevation to minimize Rammed Aggregate Pier installation depths. Ground elevations and bottom of footing elevations shall be provided to the Rammed Aggregate Pier Installer in sufficient detail to estimate installation depth elevations to within 3 inches.

C. The General Contractor will provide site access to the Installer, after earthwork in the area has been completed. A working surface shall be established and maintained by the General Contractor to provide wet weather protection of the subgrade and to provide access for efficient operation of the Rammed Aggregate Pier installation.

D. Prior to, during and following Rammed Aggregate Pier installation, the General Contractor shall provide positive drainage to protect the site from wet weather and surface ponding of water.

E. If spoils are generated by Rammed Aggregate Pier installation, spoil removal from the Rammed Aggregate Pier work area in a timely manner to prevent interruption of Rammed Aggregate Pier installation is required.

7.02 Rammed Aggregate Pier Layout

The location of Rammed Aggregate Pier-supported foundations for this project, including layout of individual Rammed Aggregate Pier elements, shall be marked in the field using survey stakes or similar means at locations shown on the drawings.

7.03 Contractor's / Owner's Independent Testing Agency (Owner's Quality Assurance)

General Contractor is responsible for acquiring an Independent Testing Agency (Quality Assurance) as required. Testing Agency roles are as described in Part 6 of this specification. The Aggregate Pier Installer will provide Quality Control services as described in Part 4 of this specification.

7.04 Excavations of Obstructions

A. Should any obstruction be encountered during Rammed Aggregate Pier installation, the General Contractor shall be responsible for promptly removing such obstruction, or the pier shall be relocated or abandoned. Obstructions include, but are not limited to, boulders, timbers, concrete, bricks, utility lines, etc., which shall prevent placing the piers to the required depth, or shall cause the pier to drift from the required location.

B. Dense natural rock or weathered rock layers shall not be deemed obstructions, and piers may be terminated short of design lengths on such materials.

7.05 Utility Excavations

The General Contractor shall coordinate all excavations made subsequent to Rammed Aggregate Pier installations so that excavations do not encroach on the piers as shown in the Rammed Aggregate Pier construction drawings. Protection of completed Rammed Aggregate Pier elements is the responsibility of the General Contractor. In the event that utility excavations are required in close proximity to the installed Rammed Aggregate Pier elements, the General Contractor shall contact the Rammed Aggregate Pier Designer immediately to develop construction solutions to minimize impacts on the installed Aggregate Pier elements.

7.06 Footing Bottoms

A. Excavation and surface compaction of all footings shall be the responsibility of the General Contractor.

B. Foundation excavations to expose the tops of Rammed Aggregate Pier elements shall be made in a workman-like manner, and shall be protected until concrete placement, with procedures and equipment best suited to (1) avoid exposure to water, (2) prevent softening of the matrix soil between and around the Rammed Aggregate Pier elements before pouring structural concrete, and (3) achieve direct and firm contact between the dense, undisturbed Rammed Aggregate Pier elements and the concrete footing.

C. All excavations for footing bottoms supported by Rammed Aggregate Pier foundations shall be prepared in the following manner by the General Contractor. Recommended procedures for achieving these goals are to:

1. Limit over-excavation below the bottom of the footing to 3-inches (including disturbance from the teeth of the excavation equipment).

2. Compaction of surface soil and top of Rammed Aggregate Pier elements shall be prepared using a motorized impact compactor (“Wacker Packer,” “Jumping Jack,” or similar). Sled-type tamping devices shall only be used in granular soils and when approved by the designer. Loose or soft surficial soil over the entire footing bottom shall be recompacted or removed, respectively. The surface of the aggregate pier shall be recompacted prior to completing footing bottom preparation.

3. Place footing concrete immediately after footing excavation is made and approved, preferably the same day as the excavation. Footing concrete must be placed on the same day if the footing is bearing on moisture-sensitive soils. If same day placement of footing concrete is not possible, open excavations shall be protected from surface water accumulation. A lean concrete mud-mat may be used to accomplish this. Other methods must be pre-approved by the Designer.

D. The following criteria shall apply, and a written inspection report sealed by the project Testing Agency shall be furnished to the Installer to confirm:

1. That water (which may soften the unconfined matrix soil between and around the Rammed Aggregate Pier elements, and may have detrimental effects on the supporting capability of the Rammed Aggregate Pier reinforced subgrade) has not been allowed to pond in the footing excavation at any time.

2. That all Rammed Aggregate Pier elements designed for each footing have been exposed in the footing excavation.

3. That immediately before footing construction, the tops of Rammed Aggregate Pier elements exposed in each footing excavation have been inspected and recompacted as necessary with mechanical compaction equipment.

4. That no excavations or drilled shafts (elevator, etc) have been made after installation of Aggregate Pier elements within the excavation limits described in the Rammed Aggregate Pier construction drawings, without the written approval of the Installer or Designer.

E. Failure to provide the above inspection and certification by the Testing Agency, which is beyond the responsibility of the Rammed Aggregate Pier Installer, may void any written or implied warranty on the performance of the Rammed Aggregate Pier system.

END OF SECTION

SECTION 32 1216

ASPHALT PAVING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Paving for playground, parking areas, areas between buildings, synthetic track surfacing adjacent to planting and turf areas as indicated.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 31 2200 - Grading.

3. Section 32 0117 - Pavement Repair.

4. Section 31 2326 - Base Course.

5. Section 32 1236 - Seal for Bituminous Surfacing.

6. Section 32 1313 - Site Concrete Work.

1.02 SUBMITTALS

A. Shop Drawings: Submit site plan indicating extent of paving and accessories.

B. Product Data: Manufacturer’s technical data for materials and products.

1.03 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction.

1.04 PROJECT CONDITIONS

A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

B A copy of the soils report is available for examination in the office of the Architect during regular office hours of the Architect.

PART 2 - PRODUCTS

2.01 BITUMINOUS MATERIALS

A. Provide materials of the class, grade, or type indicated on the Drawings, conforming to relevant provisions of Section 203 - Bituminous Materials of the Standard Specifications for Public Works Construction.

2.02 HEADERS

A. Concrete: Per specification Section 32 1313 - Site Concrete Work.

B. Wood:

1. Redwood, Construction Heart Grade, size 2 by 6, unless otherwise indicated.

2. Stakes: 2 by 4 redwood or 2 by 3 Douglas fir, Construction Grade.

3. Nails: Common, galvanized, 12d minimum.

PART 3 - EXECUTION

3.01 HEADERS

A. Install headers along edge of bituminous surfacing abutting turf, earth, or planting area, unless indicated otherwise.

B. Install headers so the bottom surface has continuous bearing on solid grade. Where excavation for headers is undercut, thoroughly tamp soil under the header. Compact backfill on both sides of header to the density of adjacent undisturbed earth.

C. Where wood headers are indicated on drawing, fasten headers in place with redwood or Douglas fir stakes of length necessary to extend into solid grade a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically, and securely nailed to headers. Space stakes, not to exceed 4 feet on center with top of stakes set one inch below top of header. Provide a minimum of two 12d galvanized common nails through each stake.

D. Remove existing headers where new surfacing is installed adjacent to existing surfacing.

E. Install temporary headers at transverse joints of paving where continuous paving operations are not maintained.

F. Provide additional stakes and anchorage as required to fasten headers in place.

3.02 CONSTRUCTION OF ASPHALT CONCRETE PAVEMENT

A. Thickness of Surfacing: Unless otherwise indicated on Drawings or specified, install bituminous surfacing to a compacted thickness of 2 inches.

B. Provide surfacing material over base course as specified in Section 31 2326 - Base Course.

C. Surfaces of walls, concrete, masonry, or existing bituminous surfacing indicated to be in direct contact with installed bituminous surfacing shall be cleaned, dried and uniformly coated with an asphaltic emulsion film.

D. Thicken edges of bituminous surfacing that do not abut walls, concrete, or masonry, and edges joining existing bituminous surfaces. Remove headers at existing bituminous surfacing where new bituminous surfacing is to be installed. Thicken edges an additional 2 inches and taper to the indicated or specified thickness 6 inches back from such edges.

E. At stairways, adjust thickness of paving such that the first tread is equal in height to all other treads.

F. Provide adequate protection for concrete, planting areas, and other finish Work adjacent to areas indicated to receive bituminous surfacing.

G. Placing:

1. Do not install bituminous surfacing when atmospheric temperature is below 40 degrees F; or when fog or other unsuitable weather conditions are present. Temperature of mixture at time of installation shall not be lower than 260 degrees F in warm weather or higher than 320 degrees F in cold weather.

2. Where 2-inch or 3-inch thick surfacing is indicated or specified, install surfacing in one course. Where surfacing is indicated or specified 4 inches or more in thickness, except for thickened edges, install bituminous surfacing in courses of approximately equal thickness, each course not exceeding 2 ½ inches in thickness.

H. Stakes or Screeds: Provide grade or screed stakes spaced not more than 15 feet apart in flow lines with grades of less than one percent. Continuous screeds may be provided instead of stakes.

I. Spreading: Install bituminous surfacing in a manner to cause least possible handling of mixture. In open areas and wherever practicable, install by mechanical means with a self-propelled mechanical spreader. In confined or restricted areas, install mixture with hot shovels and rakes, and smooth with lutes.

J. Joints: Provide vertical joints between successive runs. Install joints true to line, grade, and cross section. Lapped joints are not permitted.

K. Rolling:

1. Finish roll with a self-propelled tandem roller weighing at least 8 tons. Break down roll with a self-propelled roller weighing between 1 ½ tons and 8 tons.

2. Roll in a manner that preserves flow lines and the established finished grades. Break down roll in areas adjacent to flow lines parallel to flow lines. Break down roll after bituminous surfacing is installed without shoving or cracking of mixture under roller. Continue finish rolling until surfacing is unyielding, true to grade, and meets requirements for specified smoothness. Areas inaccessible to finish roller may be finish rolled with breakdown roller or tamped with hot tamping irons and smoothed with hot smoothing irons or hand roller.

3. Where bituminous surfacing abuts concrete, masonry, walks or paving, tamp joint smooth, if necessary, as described above to obtain a uniformly even joint, true to line and grade. Tamp and smooth to properly compact.

4. Compacted bituminous surfacing shall be provided with a bulk specific gravity of at least 2.31 when tested in accordance with ASTM D1188.

3.03 TOLERANCE

A. Smoothness: Surface of bituminous surfacing after rolling, shall be even, smooth and uniform in texture with no voids or rock pockets, free of roller marks or other irregularities, and not varying by more than 0.03 foot, except at local depressions or raised areas as indicated, when a 10-foot straightedge is placed on surface.

B. Grade: Finished grade shall not vary more than 0.02 foot above or below required grade. Variations within prescribed tolerance shall be compensating so that average grade and cross-section are provided.

C. Premium paving tolerances and requirements for synthetic track:

1. General: Test in-place asphalt concrete courses for compliance with requirements or thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Owner's representative.

2. Thickness: Tolerances for thickness shall be ¼ inch, plus or minus.

3. Planarity: The asphalt substrate shall not vary from the planned cross slope by more than plus or minus 0.1 percent. The finished asphalt shall not vary, plus or minus, under a 10 feet straight edge greater than 1/8 inch. Flood test the surface with the use of a water truck. If, after 30 minutes on a 70 degree F day, "bird baths" are evident at a depth more than 1/8 inch repair using the best method of correction.

4. Corrective Measures: Determine if the planarity, cross slopes, and general specifications have been met. If all of the conditions have been met notify the Owner in writing of the acceptance of the asphalt paving. [This notification must include the acceptance of the paving by the track surfacing contractor.]

5. No slurry or fog seals are to be applied to areas of asphalt paving that are to receive synthetic track surfacing.

3.04 TESTING

A. After first coat of surface seal has been installed and after a 24 hour period, the flood test shall be completed of the bituminous surfacing in presence of the Project Inspector. Repair areas of standing water or puddles and flood test locally; install surface seal and retest as necessary.

3.05 SURFACE SEALING

A. After bituminous surfacing has passed flood test, clear and allow to dry and provide one more coat of surface seal as specified in Section 32 1236 - Seal for Bituminous Surfacing.

B. Where indicated, provide multiple coats of surface seal to existing bituminous surfacing.

C. Where new bituminous surfacing joins existing bituminous surfacing, overlap surface seal a minimum of 12 inches onto existing bituminous surfacing.

3.06 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.07 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 32 1313

SITE CONCRETE WORK

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: On-site concrete work:

1. Portland cement concrete pavement, driveways, curbs, gutters and mowing strips.

2. Ramps and stairs on grade.

3. Footings for fence posts, bollards, flagpoles, shade structures, light standards and athletic and playground equipment.

4. Pipe encasements, thrust blocks, and equipment pads.

5. Retaining walls, planter walls and concrete benches.

6. Skateboard deterrents.

B. Related Requirements:

1. Section 03 1000 – Concrete Forming and Accessories.

2. Section 03 2000 - Concrete Reinforcement.

3. Section 03 3000 – Cast-in-Place Concrete.

4. Section 31 2200 – Grading.

5. Section 31 2316 - Excavation and Fill for Pavement.

6. Section 31 2319 – Excavation and Fill for Structures.

7. Section 31 2326 - Base Course.

8. Section 33 1100 - Site Water Distribution Utilities.

9. Section 33 3000 - Site Sanitary Sewer Utilities.

10. Section 33 4000 - Storm Drainage Utilities.

1.02 REFERENCES

A. Structural work, such as retaining walls, planter walls, cast-in-place benches, equipment pads, and footings for playground equipment, fences, walls, shade structures and flagpoles shall conform to the following Sections:

1. Section 03 1000 Concrete Forming.

2. Section 03 2000 Concrete Reinforcing.

3. Section 03 3000 Cast-in-Place Concrete.

B. Flatwork, such as walkways, driveways, ramps and steps on grade, swales, curbs, mow strips and utility related concrete, conform to:

1. Standard Specifications for Public Works Construction, The “Greenbook”, except reclaimed aggregates and processed miscellaneous base are not allowed.

C. Imported or exported earthwork shall conform to Section 01 4524 Environmental Import / Export Materials Testing.

D. National Ready Mixed Concrete Association (NRMCA):

1. Checklist for the Concrete Pre-Construction Conference.

1.03 QUALITY ASSURANCE

A. Source Limitations for Exposed Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from single manufacturer with resources to provide concrete of consistent quality in appearance and physical properties. Secure material required for the duration of the project as needed to ensure consistent quality in appearance.

B. Pre-Installation Conference:

1. CONTRACTOR shall use the NRMCA “Checklist for the Concrete Pre-Construction Conference” as the meeting agenda.

C. Mockup:

1. Build 8 feet by 8 feet mockups of full-thickness sections of concrete paving using processes and techniques intended for use on permanent work, including curing procedures.

2. Build mockups to demonstrate typical joints; surface finishes and standard of workmanship.

3. Obtain ARCHITECT’s approval of mockup before proceeding with work of this Section.

4. Mockup shall remain through completion of the work for use as a quality standard for finished work.

5. Remove mockup when directed by the OAR.

D. Field applied primers, paintings, sealers, sealants, caulking, leveling and patching compounds, crack/joint repair compounds adhesives and similar products shall be approved by the OWNER’s Office of Environmental Health and Safety (OEHS).

1.04 SUBMITTALS

A. Structural Work: Conform to the applicable requirements of Sections 03 1000 Concrete Forming, 03 2000 Concrete Reinforcing and 03 3000 Cast-in-Place Concrete.

B. Flatwork: Submit mix design in conformance to the Greenbook.

C. Shop Drawings: Submit drawings indicating the locations of concrete joints, including construction joints, expansion joints, isolation joints, and contraction joints.

1.05 DELIVERY, STORAGE AND HANDLING

A. Store cement and aggregate materials so to prevent their deterioration or intrusion by foreign matter. Deteriorated or contaminated materials shall not be furnished.

B. Packaged materials shall bear the manufacturers and brand name label and shall be stored in their original unbroken package in a weather tight place until ready for use in the work.

C. Avoid exposure of reinforcing steel bars, wire, and wire fabric to dirt, moisture or conditions harmful to reinforcing.

D. Reinforcing steel bars, wire, and wire fabric shall be stored on the Project site to permit easy access for examination and identification of each shipment. Material of each shipment shall be separated by size and shape.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Work: Conform to the applicable requirements of the following Sections, except as otherwise specified:

1. Section 03 1000 Concrete Forming.

2. Section 03 2000 Concrete Reinforcing.

3. Section 03 3000 Cast-in-Place Concrete.

B. Flatwork: Conform to the applicable requirements of the Greenbook, Section 201, except as follows:

1. Water/cement ratio for concrete flatwork shall be 0.50 maximum.

2. Base course shall conform to Section 32 3226 Base Course.

3. Reclaimed concrete material shall not be used.

2.02 SKATEBOARD DETERRENTS

A. Manufacturer: Barrett Robinson Inc. or equal.

B. Fabricated from 6061-T6 aluminum, clear anodized.

1. Fixed Angle Series:

a. FR0.12: For walls with 1/8" radius edge. Dimensions: 4.875" top x 1.0" face x 2.0" wide.

b. FA90A: For walls with 1/8" radius edge. Dimensions: 4.0" top x 2.375" face x 2.0" wide.

c. FA135: For chamfered edges, where the chamfer is 3/4” or more. Dimensions: 2" wide X 3-1/2" long X 1-1/8" tall.

d. FA902.5: For 90 degree walls with 1/2" radius edge. Dimensions: 3.75" top x 2.375" face x 2.0" wide.

2. Fixed Radius:

a. FR.12: For 1/8" radiused edges. Dimensions: 4.875" top x 1.0" face x 2.0" wide.

b. FR.05: For 1/2" radiused edges. Dimensions: 3.75" top x 1.0" face x 2.0" wide.

c. FR1.0: For 1" radiused edges. Dimensions: 4.375" top x 1.625" face x 2.0" wide.

3. Gorilla Series:

a. Gorilla 012: Rounded edge. For square corners from 0” - 3/8” radius. Size: 1-1/8” wide x 8” deep x 1-1/8”.

b. Gorilla 0135: Chamfered edge. For square corners from 0” - 3/8” radius. Size: 1-1/8” wide x 8” deep x 1-1/8”.

4. Two-part epoxy adhesive shall be approved by the OWNER’s Office of Environmental Health and Safety (OEHS).

5. Fastening pins as recommended by skateboard deterrent manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that gradients and elevations of base are correct. Maintain subgrade clean and in a smooth, compacted condition until the concrete is placed.

B. Maintain subgrade in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. Earth surface shall be kept moist by frequent sprinkling up to the time of placing concrete.

3.02 CONSTRUCTION OF FORMS

A. Flatwork Forming: Set forms to the indicated alignment, grade and dimensions. Hold forms rigidly in place by a minimum of 4 stakes per form placed at intervals not to exceed two feet. Use additional stakes and braces at corners, deep sections, and radius bends, as required. Use clamps, spreaders, and braces where required to ensure rigidity in the forms.

B. Wall Formwork: Forms shall be constructed to conform to final concrete shape, lines and dimensions of members required by Drawings and Specifications. Forms shall be sufficiently tight to prevent leakage of concrete and properly braced or tied together to maintain position and shape.

3.03 STEEL REINFORCEMENT INSTALLATION

A. Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcement for bending. Bend bars No. 6 size and larger in the shop only. Bars with unscheduled kinks or bends are not permitted.

B. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

C. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces, and lace splices with wire.

D. Clean reinforcement of loose rust and mill scale, earth, or bond-reducing materials.

3.04 PREPARATION FOR CONCRETE PLACEMENT

A. Surfaces to receive concrete shall be free of debris, standing water, and any other deleterious substances before start of concrete placing.

B. Do not place concrete until forms, reinforcement, pipe, conduits, outlet boxes, anchors, sleeves, bolts, and other embedded materials are securely fastened in place. Maintain a minimum of two inches clearance between said items and any part of the concrete reinforcement.

C. Adjust pull boxes, meter boxes, valve covers and manholes to proposed finish grade prior to placement of concrete. Anchor bolts shall be accurately set and maintained in position by templates while being embedded in concrete.

D. Clean thoroughly the surfaces of metalwork to be in contact with concrete, remove dirt, grease, loose scale and rust, grout, mortar, and other foreign substances before the concrete is placed.

E. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

3.05 CONCRETE PLACEMENT

A. Place, compact, screed, float and trowel concrete as indicated in Section 03 3000 Cast-in-Place Concrete.

B. Finish: After straight edging, when most of the water sheen has disappeared and just before the concrete hardens, finish the surface with a wood or magnesium float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. Produce a scored surface by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

1. Provide medium broom finish on surfaces up to six percent slope by striating surface 1/32 to 3/64 inch deep with a soft bristle broom across concrete surface to provide a uniform fine line texture.

2. Provide heavy broom finish on surfaces over six percent by striating surface 1/16 inch to 1/8 inch deep with a stiff-bristled broom.

3.06 JOINTS

A. Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated. Align curb, gutter, and sidewalk joints.

B. Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour.

1. Continue steel reinforcement across construction joints unless otherwise indicated on the Drawings.

2. Provide tie bars at sides of paving strips where indicated on the Drawings

3. Butt Joints: Use bonding agent or epoxy-bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.

5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated on the Drawings.

D. Expansion Joints:

1. Provide premolded joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together. Extend expansion joint fillers full-width and depth of joint, and 1/4" below finished surface where joint filler is indicated. If no joint sealer is indicated place top of premolded joint filler flush with top of concrete or curb.

2. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints to a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Remove grooving-tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

F. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Remove edging-tool marks on concrete surfaces.

G. Where concrete is to be cast against old concrete, (greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by sand-blasting, exposing the aggregate. The hardened surface shall be cleaned of latent foreign material and washed clean, prior to the application of an epoxy bonding agent.

3.07 STAIRS AND RAMPS

A. Install support post sleeves into the perimeter concrete curbing during the installation process of the curbing. Sleeves shall be three-inch diameter, schedule 40 PVC with a cap solvent welded to the bottom of the sleeve. Drill a half-inch weep hole on the bottom of the cap. Sleeve and cap shall be Nibco products or approved equal. Sleeves shall be embedded into concrete a minimum of nine inches and spaced at a maximum of four feet, or as indicated on the Drawings. Fill sleeve with non-shrink grout Quickcrete #1585-01 when setting posts. Provide control joints into the concrete on both sides for each post.

B. Finish step nosings with a safety step edger/groover with a 1/2 inch radius and four grooves spaced equally 3/4 inch on center and a bit depth between 1/4 to 3/8 inch. Paint with contrasting color.

3.08 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

A. Formed Curb and Gutter: Place concrete to the required section in a single lift. Consolidate concrete using approved mechanical vibrators. Finish curve shaped gutters with a standard curb mule or concrete slip-formed curb paving equipment.

B. Concrete Finishing: Float and finish exposed surfaces with a smooth wood float until true to grade and section and uniform in texture. Brush floated surfaces with a fine-hair brush using longitudinal strokes. Round the edges of the gutter and top of the curb with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, rub

the face of the curb with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. Brush the front curb surface, while still wet, in the same manner as the gutter and curb top. Finish the top surface of gutter to grade with a wood float.

C. Surface and Thickness Tolerances: Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.09 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project Site.

3.10 PROTECTION

A. Protect the work of this section until substantial completion.

END OF SECTION

SECTION 32 1723

PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 REFERENCE:

A. Related Sections:

1. Section 32 1216: Asphalt Paving.

1.02 DESCRIPTION:

A. Principal Work Items Are:

1. Painted lines, lettering, and symbols at parking areas.

2. Painted stripes at exterior stairs.

3. Fire Lane “No Parking.”

4. Curb marking and red curbs.

1.03 JOB CONDITIONS:

A. Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

B. Sequencing, Scheduling: Coordinate with paving work. Verify that paint type is compatible with asphalt paving surfaces seal coats.

C. Protection: Do not apply pavement markings for seven days after application of asphalt surface seal coat. After application, protect from traffic until thoroughly dry.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Traffic Paint:

1. Type: Water base, roadway traffic lane marking type; colors as selected.

2. Acceptable Manufacturers:

a. Dunn-Edwards, Vin-L-Stripe No. W-801, vinyl-epoxy as a standard of quality.

b. J. E. Bauer latex base Formula No. 1030A9 White, No. 1056A9 Yellow, No. 1865A9 Blue, No. 1118A9 Green, and No. 1854A9 Red.

c. Sinclair No. 160 Vinyl Traffic Line Paint, water base.

d. Ennis Traffic Safety Solutions, product 6000 white & 6006 blue.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Layout: Accurately measure and layout work. Use stencils for all work; snap lines for straight work.

B. Prior to application of paint, allow the pavement to properly cure. Clean and prepare in accordance with paint manufacturer's written recommendations.

C. Provide mechanical equipment to install paint in a uniform, straight or curved pattern, without holidays and other defects.

D. Do not permit traffic until paint has completely cured.

E. Provide two installations/applications of pavement marking; once for initial use and once after final seal coat.

F. Install 2 coats in thickness recommended by manufacturer.

3.02 APPLICATION:

A. Painted Lines, Lettering, and Symbols At Parking Areas:

1. Parking Stall Lines: 4 inches wide, color white.

2. Access aisles for accessible parking spaces shall be marked by a blue painted borderline around their perimeter. The area within the blue borderlines shall be marked with hatched lines a maximum of 36” on center in a color contrasting with that of the aisle surface, preferably blue or white. Access aisle markings may extend beyond the minimum required length. CBC Section 11B-502.3.3.

3. Access aisles for passenger drop-off and loading zone shall be marked with a painted borderline around the perimeter. The area within the borderlines shall be marked with hatched lines a maximum of 36” on center in a color contrasting with that of the aisle surface. CBC section 11B-503.5.

4. Color: White, for all work except blue at wheelchair accessible parking stalls borders and red at Fire Lanes.

5. Specific areas designated as fire lanes must be marked with red curbs using OSHA safety red paint. “FIRE LANE – NO PARKING” shall be painted on the top of curb in 3” white lettering at a spacing of 30’ on center or portion thereof.

6. Painted lines and markings on pavement at wheelchair accessible parking stalls shall be 4 inches wide (blue in color) equal of Color No. 15090 per Federal Standard 595C.

7. Detectable warnings surfaces shall comply with CBC Section 11B-705.1.

8. Detectable warning surfaces shall be yellow conforming to FS 33538 of Federal Standard 595C. CBC Sections 11B-705.1.1.3 and 11B-705.1.1.5.

9. Provide a minimum 5 year warranty on detectable warning surfaces per DSA Bulletin 10/31/02, revised 04/09/08.

B. Stripes At Exterior Stairs:

1. Stripes: 2" wide, located 2" from, and parallel to, nosing.

2. Required Locations: All treads, all top landings, all intermediate landings.

END OF SECTION

SECTION 32 3113

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Chain link fences and gates as indicated.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 05 5000 - Metal Fabrications.

3. Section 31 2000 - Grading.

4. Section 32 0117 - Pavement Repair.

5. Section 32 1313 - Site Concrete Work.

1.02 SUBMITTALS

A. Shop Drawings:

1. Submit plans and details indicating extent of fences, locations of gates, and details of attachment and footings. Indicate means and methods for surface preparation and finishing.

1.03 QUALITY ASSURANCE

A. Chain Link Gates withing the accessible route of travel shall comply with all applicable door requirements per CBC 11B-404.

B. Chain Link Fence Manufacturers Institute: CLFMI Product Manual.

C. ASTM A123: Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

D. ASTM A392: Specification for Zinc-Coated Steel Chain Link Fence Fabric. ASTM F567: Practice for Installation of Chain Link Fence.

E. ASTM F626: Specification for Fence Fittings.

F. ASTM F668: Specification for Poly(Vinyl Chloride) (PVC) and Other Organic Polymer-Coated Steel Chain Link Fence Fabric.

G. ASTM F900: Specification for Industrial and Commercial Swing Gates.

H. ASTM F1083: Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

I. ASTM F1184: Specification for Industrial and Commercial Horizontal Slide Gates.

J. ASTM F1553: Guide for Specifying Chain Link Fence.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete Materials and Properties: Comply with requirements of Section 03 3000 - Cast-in-Place Concrete to provide normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3,000 psi, 4-inch slump, and one inch maximum size aggregate.

1. Concrete may be provided in the following volumetric proportions:

Portland Cement	1 part
Fine Aggregate	2 parts
Coarse Aggregate (1/4 inch to 1-1/2 inches)	4 parts
Water	7 ½ gallons, maximum per sack of cement

B. Chain Link Fence Fabric (Vinyl Clad): Conforming to ASTM A 392, Class C2 zinc coating, 2.00 ounces minimum per square foot of uncoated wire surface, hot-dipped galvanized after weaving, and top and bottom edges knuckled.

1. Fabric: 9-gage steel wire zinc-coated in accordance with ASTM A392 and woven in 1-inch diamond mesh; top and bottom selvages shall be knuckled. Fabric width shall be one-piece unless otherwise specified.

   Fabric shall be factory coated with a min. .02 inch thick coating of plasticized polyvinyl-chloride Class 2B fused and bonded applied by the fusion method over a thermoset plastic bonding agent. The bind shall exhibit equal or greater strength than the cohesive strength of the vinyl. All ends shall be coated with vinyl at the factory. Fabric shall be black in color.

2. For perimeter fences 16 feet high, the upper 8 feet of fabric may be 11 gage.

3. Fences 12 feet high or less shall be furnished with single width fabric.

4. Installed fence fabric shall be free from barbs, icicles, or other projections and installed fence fabric with such defects will be deemed defective Work.

C. Posts, Top Rails, Brace Rails and Gate Frames: Standard weight, galvanized, welded or seamless steel pipe conforming to ASTM F 1083, with a minimum yield strength of 35,000 psi. Embed posts into footing 6 inches less than the depth of the footing unless noted otherwise on drawings.

D. Schedule of Posts and Footings:

Item	Height	Nominal Pipe Size (inches)	Outside Diameter (inches)	Weight (pounds per foot)	Footings*	
					Diameter(inches)	Depth (inches)
Top Rail, Brace Rails and Transom Rails	Up to 10'-0"	1-1/4	1.660	2.27	N/A	N/A
	10'-1" to 16'-0"	1-1/2	1.900	2.72	N/A	N/A
Line Posts	Up to 6'-0"	2	2.375	2.65	12	24
	6'-1" to 8'-0"	2	2.375	2.65	12	36
	8'-1" to 10'-0"	2-1/2	2.875	5.79	12	36
	10'-1" to 16'-0"	3	3.5	7.58	14	60
Terminal, Corner, Angle & Pull Posts	Up to 8'-0"	2-1/2	2.875	5.79	12	36
	8'-0" to 10'-0"	2-1/2	2.875	5.79	14	42
	10'-1" to 16'-0"	3	3.5	7.58	14	60
Pedestrian Gate Posts	Up to 8'-0"	2-1/2	2.875	5.79	14	36
Gate Frames	Up to 8'-0"	1-1/2	1.900	2.72	N/A	N/A
Driveway Double-Leaf Swing Gate Posts: Opening						
Up to17'-3-1/2"	Up to 8'-0"	3 1/2	4	9.11	16	42
17'-4" to 20'-3-1/2"	Up to 8'-0"	3-1/2	4	9.11	16	42

E. Post Caps: Malleable iron, ASTM F 626, , designed to fit snugly over posts with a minimum projection of 1-1/2 inches below top of posts. Post caps shall be manufactured with a curved top.

F. Eye Tops: Malleable iron, ASTM F 626, , designed to fit over line posts, and for through passage of top rail.

G. Expansion Sleeve Couplings for Top Rails: Steel, 6 inches long, designed to fit tightly on inside of rail, fitted with raised center.

H. Rail Ends for Top Rails and Brace Rails: Malleable iron, ASTM F 626, , with holes to receive 3/8 inch bolts for securing to rail end bands.

I. Tension Bands and Bands for Securing Rail Ends: Mild steel flats, at least 11 gage x one inch, tension bands in gates shall be 11 gage by 1 inch. Bolts for use with tension bands and rail end bands shall be 3/8 inch by 1 ½-inch.

J. Tension Bars: Mild steel flats at least 3/16 inch by 3/4 inch.

K. Tension Wire for Installation at Bottom of Fabric: 6 gage steel spring wire, conforming to requirements of AISI Steel Products Manual, Carbon Steel Wire, Section 16, merchant quality, galvanized, soft temper with Type I coating. Wavy type wire is not acceptable.

L. Turnbuckles for installation with Tension Wires: Eye and hook type, drop forged steel, right and left hand threads, at least 3/8 inch screw diameter with at least 4 ½-inches of take-up.

M. Tie Wire: Aluminum ties 6 gage for fastening fabric to posts, top rails and brace rails. At bottom tension wire 9 gage galvanized hog rings shall be installed.

N. Finish of Metal Parts: Post caps, couplings, rail ends, tension bands, tension bars, turnbuckles, rivets, bolts, and other metal parts and fittings shall be hot-dipped galvanized after fabrication, except bolts, which may be galvanized or cadmium-plated. Galvanizing shall conform to ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products, and ASTM F 626Specification for Fence Fittings.

O. Paints for Refurbishing Existing Fence Posts, Rails, and Accessories: As required to provide the galvanized color of a new installation.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install fences to heights indicated on Drawings.

B. Space fence posts at equal intervals between terminal, angle, corner, and gate posts, and not more than 10 feet apart measured from center to center of posts. In curved fence sections having a radius of 50 feet or less, space posts not more than 5 feet - 6 inches apart. Install posts so that top of eye of post caps are level with top of fabric.

C. Install angle or corner posts at each change in direction of 15 degrees or more, at change of 5 percent or more in grade of fencing, and at the beginning and end of curved fence sections.

D. Install terminal posts at ends of runs of fencing. Install gateposts on both sides of driveway and pedestrian gates. For double-leaf gates, net opening between gate posts shall be gate size as indicated on Drawings, plus 3 ½-inches; for single leaf gates, net opening shall be gate size plus 2 ½-inches.

E. Where a fence is to be installed on a curb, construct footings with top of footing level with the lower finish grade. Align posts, set plumb and true before placing footings. Remove splattered concrete from exposed pipe surfaces while concrete is still soft. In bituminous surfaced areas, install seal coat on top of concrete footings.

F. Install fences with top rail. Top rail shall pass through eye tops and be secured at ends with rail-end fittings and bands.

G. Install fences over 10 feet in height, in addition to top rail, with a full length horizontal mid-rail set at mid-height of fence and rigidly secured to posts with rail end fittings and bands.

H. In fences higher than 10 feet, install brace rails at angles, corners, and terminals at 1/4 and 3/4 of fence height. Provide one horizontal brace rail in panels adjacent to terminal, angle, corner, and gateposts, install at mid-height of fence and rigidly secured to posts with rail end fittings and bands. Provide horizontal brace rails, as specified, in panels of curved sections having a radius of 50 feet or less. Brace rails are not required in fencing 4 feet or less in height.

I. Provide a transom rail and fabric at top of pedestrian gate openings. Install transom rail 6 feet 8 inches above high point of grade at gate opening. Ends of transom rails shall be pinned or riveted to rail end fittings with 1/4 inch mild steel rivets. Pin or rivet must go through rail and peen. Welding on rail ends is not permitted.

J. Install bottom tension wire a minimum of 3 inches from grade for fencing, and provide a turnbuckle for each 150 feet of wire or fractional part thereof. Turnbuckles are not required in runs of 15 feet or less. Install ends of tension wires to posts in a manner to prevent slipping or loss of tension. Wrap should start from fence side of post. Turn end of wire around post tightly twisted at least three times around wire. At turnbuckles, wire through eye and tightly twist end at least three times around wire. Cut tail of bottom wire flush.

K. Install fence fabric on outward facing side of posts, except for tennis courts. Install fence fabric with top edge projecting above top rail of fence.

L. Install bottom of fence fabric to clear finish grades, except on bituminous surface install 3/4 inch above such surface. Locally shape and trench ground surfaces where necessary to provide uniform top and bottom alignment of fence.

M. Tightly stretch fabric and at terminal, pull corner, angle, and gateposts, secure with tension bars extending full height of fence. Secure tension bars to posts with bolted tension bands spaced not more than 14 inches apart.

N. Bands and Ties: Install bands and ties in accordance with following schedule:

15 bands on 16 feet fence	16 ties on 16 feet fence
11 bands on 12 feet fence	12 ties on 12 feet fence
7 bands on 8 feet fence	7 ties on 8 feet fence
6 bands on 6 feet fence	6 ties on 6 feet fence
4 bands on 4 feet fence	4 ties on 4 feet fence

O. Fasten fabric to line posts with wire ties spaced not more than 16 inches apart. Where 6 gage aluminum ties are furnished, hook the tie at both ends. Installation of hooked ties with links is not permitted.

P. Fasten fabric to top rails, mid-rails, brace rails, with wire ties spaced not more than 18 inches apart. Bend back ends of tie wires so as not to be a hazard. At bottom tension wire, install hog rings spaced not more than 18 inches apart. Where 2 fabrics are furnished, lap the fabrics one mesh at mid-rail and tie both fabrics with 9 gage wire or 6 gage aluminum ties to midrails.

Q. Grind all field welds smooth, clean off flux and spatter, damaged galvanizing removed, burrs and projections ground off, properly prepared, then heavily coated with galvanizing repair coating as specified in Section 05 5000; or equal product approved by Owner's Office of Environmental Health and Safety. Install coating in accordance with written recommendations of manufacturer.

R. Fabrication of Gates:

1. Frames: Fabricate gate frames from steel pipe of size specified, with joints at corners miter cut and continuously welded to sides.

2. Fabric: Install fence fabric to side members with tension bars and tension bands as specified, spaced not more than 14 inches apart. Tension bars shall extend full height of gate. Install fence fabric to top and bottom members and to brace rail with wire ties as specified for top rails, spaced not more than 12 inches apart.

3. Latches: Gate latches and strikes will be furnished by the Owner. Weld gate latches and strikes to gate posts and frames. Welding shall be performed before gate frames are galvanized, or welds shall be finished as specified for field welds.

4. Hinges: Install and adjust hinges; burr or center punch threads of gate hinge bolts to prevent removal of nuts. Install 3 hinges on each post for swing gates more than 16 feet wide. Hinges will be provided by the Owner.

5. Grind welds flush and smooth. Hot-dip galvanize fabricated parts after welding, or finish weld as specified for field welds.

3.02 NOT USED

3.03 NOT USED

3.04 INSTALLATION ON TOP OF CONCRETE WALLS

A. Posts for fences on top of new concrete or concrete masonry walls shall be installed in 24 gage galvanized iron inserts one inch larger than the outside post diameter. Wall thickness for such installation shall be 8 inches minimum. Depth of embedment of post shall not be less than 15 inches for fence height not exceeding 4 feet. Install post plumb, true, and fill joint space with non-shrink grout as specified in Section 05 5000, finished flush with top of wall. Remove excess grout and clean posts.

B. Fencing on Gravity Walls: Post of fence not exceeding 8 feet high shall have a minimum of 15 inches embedment in gravity walls with a top width of 10 inches minimum and side of 1H: 4V. Where the height of gravity wall from top to bottom, within 5 feet from each side of a post, is less than 22 inches, provide concrete fence post footings and embed posts in accordance with the schedule of posts and footings as set forth in this section.

C. Do not install footings on existing walls without the review of the Architect and DSA.

3.05 REINSTALLED FENCING

A. Where existing fencing is indicated to be reset or relocated, remove existing concrete footings from posts and legally dispose of off the Project site. Construct new concrete footings, as specified, in their designated location. Replace parts of fencing broken or damaged during removal and re-installation with new parts as specified to complete reinstallation. New materials shall closely match design of existing installation. Top rail will be required in reinstalled fencing, which does not have top rail in its existing condition. Install as specified for new installations.

B. Existing fences shall be reset where finish pavement is raised or lowered more than 6 inches from existing grade. Remove and reinstall entire fence assembly as specified.

3.06 FENCING ADJUSTMENTS

A. Where the finish grade is raised 6 inches or less, cut and re-knuckle the existing fence fabric. Adjust tension wire and tie to fabric. Bottom of fence fabric shall be installed ¾" above finish grade.

B. Where the finish pavement is lowered 6 inches or less, demolish the fence footing flush with the finish grade and adjust the fabric and its attachments. Bottom of fence fabric shall be installed ¾ inches above finish grade.

C. Post footings and fabrics that require readjustment after installation shall be entirely replaced.

3.07 INSTALLATION OF GATES

A. Provide gates of the sizes indicated on Drawings. Allow clearance on gates of 1-1/2 inches at bottom and one inch at top. Construct gates installed in sloping areas to conform to the grade. Provide an opening in each gate for access to locking device or padlock. Knuckle ends of fabric cut for opening to eliminate hazards.

B. Sliding Gates and Swing Barricade Gates: Fabricate and install as indicated on Drawings. Wheel housing must be designed to fit tightly to roll track and prevent gate from rolling over objects. Unsupported cantilever type roll gates are not acceptable. Install gate stops in accordance with the drawings. Both top and track stops are required.

3.08 NOT USED

3.09 COMPLETION

A. Completed fencing shall form continuous units between points indicated with required parts, accessories, and fittings provided and installed. Clean exposed metal surfaces of cement, grout and other foreign substances.

B. Fill in holes left by removal of existing fence footings, except in areas where grading Work is indicated or specified, to existing grade with clean earth thoroughly compacted to at least same density as adjoining soil.

3.10 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.11 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 32 3119

DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Decorative metal fences and gates as indicated.

1.02 SUBMITTALS

A. Shop Drawings:

1. The manufacturer's literature shall be submitted prior to installation.

2. Submit plans and details indicating extent of fences, locations of gates, hardware support and details of attachment and footings. Indicate means and methods for surface preparation and finishing.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with Standard Specifications for Public Works Construction, current edition.
2. Gates shall meet all applicable specifications for doors per 2016 CBC 11B-404.

B. Warranty

1. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 10 years minimum from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.

2. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufacture's warranty shall be guaranteed for five (5) years from date of original purchase.

1.04 REFERENCES

- ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-
- Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- ASTM D523 - Test Method for Specular Gloss.
- ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.

- ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.
- UL 325 - Entrapment Protection for Operated Gates
- ASTM F2200 - Safety Standards for Gate Operator Manufactures

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete: Class 500-C-2500 concrete furnished as prescribed in Section 201-1 "Concrete, Mortar and Related Materials" of the Standard Specifications for Public Works Construction or may be provided in the following volumetric proportions:

Portland Cement	1 part
Fine Aggregate	2 parts
Coarse Aggregate (1 inch)	4 parts
Water	7-1/2 gallons, maximum per sack of cement
Slump	3-inch

B. Metal fence panels, rails, pickets, swing gates, and hardware: Ameristar Montage II ‘Genesis’ 2 rail, or equal.

1. Steel material for fence panels and posts shall conform to the requirements of ASTM A653/A653M, with a minimum yield strength of 45,000 psi (310 MPa) and a minimum zinc (hot-dip galvanized) coating weight of 0.90 oz/ft2 (276 g/m2), Coating Designation G-90.

2. Material for pickets shall be 1” square x 14 Ga. tubing. The rails shall be steel channel, 1.75” x 1. 75” x .105”. Picket holes in the rail shall be spaced 4.715” O.C. Fence posts and gate posts shall meet the minimum size requirements of Table 1.

3. Pickets, rails and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.

4. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing. The aligned pickets and rails shall be joined at each picket-to-rail intersection by welding process, thus completing the rigid panel assembly.

5. The manufactured panels and posts shall be subjected to an inline electrodeposition coating (E-Coat) process consisting of a multi-stage pretreatment/wash (with zinc

phosphate), followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058 mm). The color shall be Black. The coated panels and posts shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2 (Note: The requirements in Table 2 meet or exceed the coating performance criteria of ASTM F2408).

6. The manufactured fence system shall be capable of meeting the vertical load, horizontal load, and infill performance requirements for Industrial weight fences under ASTM F2408.

7. Swing gates shall be fabricated using 1.75" x 14ga Forerunner double channel rail, 2" sq. x 11ga. gate ends, and 1" sq. x 14ga. pickets. Gates that exceed 6' in width will have a 1.75" sq. x 14ga. intermediate upright. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding. Gusset plates will be welded at each upright to rail intersection. Cable kits will be provided for additional trussing for all gates leaves over 6'. Use commercial/industrial grade hinges, MHH180, for swing gates up to 4 feet wide, with quantities as required for single or double gates. Use 'Strong Arm Gate Latch' fork latch types with quantities as required for single or double gates.

C. Rolling Gates: PassPort II 'Genesis' Steel Rolling Gate System, or equal

1. Steel material for roll gate components (i.e. pickets, rails, diagonals and uprights), shall be commercial steel with a minimum yield strength of 45,000 psi (344 MPa).

2. Ornamental picket material shall be 1" square x 14 Ga. Tubing. Picket spacing shall be 4-3/4". Material for toprails, uprights and diagonals rails shall be 2" square x 12 Ga. Material for the bottom rail shall be 2" x 4" x 11 Ga. Posts shall be a minimum of 4" square x 11 Ga.

3. Pickets/pales, rails, uprights and posts shall be precut to specified lengths. Diagonals shall be precut to specified lengths and angles. Frame materials shall be joined by welding. Pickets/pales shall be face welded to roll gate frame.

4. The manufactured roll gates and bolt-on panels shall be subjected to the PermaCoat thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pre-treatment/wash (with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be Black. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 1.

5. Completed gates shall be capable of supporting a 200 lb. load applied at midspan without permanent deformation.

D. Information schedules:

Table 1 – Minimum Sizes for Posts

Fence Posts	Panel Height
2-1/2" x 12 Ga.	Up to & Including 6' Height
3" x 12 Ga.	Over 6' Up to & Including 8' Height

Table 2 – Coating Performance Requirements		
Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 1,500 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822 D2244, D523 (60˚ Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

	Table 3 – Post Spacing By Bracket Type **					
Span	For 'GENESIS' style 8' Nominal (92-5/8" Rail)					
Post Size	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Industrial Universal 2.5" (BB302) 3" (BB303)		Industrial Flat Mount (BB301)		Industrial Swivel (BB304)*	
Post Settings ± ½" O.C.	96"	96-1/2"	96"	96-1/2"	*96"	*96-1/2"

*Note: When using BB304 swivel brackets on either or both ends of a panel installation, care must be taken to ensure the spacing between post and adjoining pickets meets applicable codes. This will require trimming one or both ends of the panel. When using the BB301 flat mount bracket for Invincible style, rail may need to be drilled to accommodate rail to bracket attachment.

**Note: Spacing and brackets in table above are for Ameristar Montage II 'Genesis' and for listed for reference. If a substitute manufacturer is submitted, spacing will need to be verified to match.

E. Schedule of Footings:

Item	Height	Footings*	
		Diameter(inches)	Depth (inches)
Line Posts	Up to 6'-0"	16	36
	6'-1" to 8'-0"	18	36
	8'-1" to 10'-0"	18	48
	10'-1" to 16'-0"	24	56
Terminal, Corner, Angle & Pull Posts	Up to 8'-0"	18	36
	8'-1" to 10'-0"	18	48
	10'-1" to 16'-0"	24	56

Gate Posts	Up to 8'-0"	24	48
*Note: Embed posts into footing 6 inches less than the depth of the footing. Deviations from footing schedule will require soil test and Architect review.			

F. Gate Operators.

1. Slide Driver 15 as manufactured by HySecurity. Power supply will be 460V, 3 phase.

a. Slide gate operators will require a minimum of TWO monitored external entrapment protection sensors (one for each direction) to protect entrapment zones in both the open and close direction of travel in accordance with UL325 and ASTM F2200.

PART 3 - EXECUTION

3.01 PRODUCT HANDLING AND STORAGE

A. Upon receipt at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage and to protect against damage, weather, vandalism and theft.

B. All hardware shall be installed in accordance with the manfacturer's installation instructions. Rolling gates shall be installed so they comply with current ASTM F2200 & UL325 standards.

C. Gate stops shall be installed on each track in a way that conforms to current ASTM F2200 standards.

3.02 INSTALLATION

A. Install fences to heights indicated on Drawings.

B. Fence post shall be spaced according to Table 3, plus or minus ½". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36" and shall be held 6" above from the bottom of the footing. The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

C. When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area. 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry. 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-manufacturer parts or components will negate the manufactures' warranty.

D. Gate posts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The

manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacturer of the gate and shall be installed per manufacturer's recommendations.

3.03 FENCING ADJUSTMENTS

A. Post footings that require readjustment after installation shall be entirely replaced.

3.04 INSTALLATION OF GATES

A. Provide gates of the sizes indicated on Drawings. Construct gates installed in sloping areas to conform to the grade. Coordinate installation of panic hardware with hardware contractor. Ensure proper and smooth operation of hardware and gate.

B. Gate posts shall be set in accordance with the spacings shown in the construction plans. Gate posts shall be set in concrete footers having a minimum depth of 48", held 6" above from the bottom of the footing. The "Earthwork" and "Concrete" sections of this specification shall govern post base material requirements. 6" wheels shall be bolted to the gate (between the wheel plates welded near the ends of the gate bottom rail). The gate shall be set upright with the V-grooved wheels positioned over the pre-installed steel V-track that traverses the gate opening. Roller guides shall be affixed to the gate posts at a height even with the gate toprail to hold the gate in a vertical position. Gate stops shall be welded to the end of the gate or track so gate cannot pass rollers in either direction.

C. All hardware shall be installed in accordance with the manufacturer's installation instructions. Motorized gates shall be installed so they comply with current ASTM F2200 & UL325 standards.

D. Gate stops shall be installed on each track in a way that conforms to current ASTM F2200 standards.

3.05 COMPLETION

A. Completed fencing shall form continuous units between points indicated with required parts, accessories, and fittings provided and installed. Clean exposed metal surfaces of cement, grout and other foreign substances.

B. Fill in holes left by removal of existing fence footings, except in areas where grading Work is indicated or specified, to existing grade with clean earth thoroughly compacted to at least same density as adjoining soil.

3.06 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.07 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 32 84 26

RECLAIMED WATER IRRIGATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Reclaimed water irrigation system.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Division 22 - Plumbing.

3. Division 26 - Electrical.

4. Section 31 2313 - Excavation and Fill.

5. Section 32 9000 - Planting.

1.02 SUBMITTALS

A. Materials List: Provide manufacturer's name and description of items to be furnished.

B. Product Data: Provide catalog cuts, technical data, and manufacturer's specifications.

C. Shop Drawings: Provide Shop Drawings indicating proposed system layout, locations of controllers, valves, backflow devices, flow sensors, master valves, quick couplers, heads and point of connections. Include details for sleeves, yard boxes, backflow devices, and controller installations.

D. Provide proof of purchase for energy saving devices to the Owner. Owner will receive rebates as part of energy savings program.

E. RECORD DOCUMENTS

1. Before Contract Completion, provide project record documents as follows:

a. On a laminated chart indicate the location of each numbered sprinkler-controlled valves and quick coupling valves with legible dimensions from two permanent points of reference such as building corners or sidewalks.

2. Closeout Submittals-As Built:

a. Submit three copies of as built including complete list of materials, manufacturer's name, and product installation literatures.

b. Record drawings: Submit dimensioned drawings and details before Contract Completion.

c. Record Drawings shall contain the following:

1) As-Built shall be computer generated (AutoCad).

2) Print shall show the locations of the numbered remote control valves, manual control valves, locations and size of supply and lateral lines, location and type of sprinkler heads, quick coupling valves, gate valves, point of connections, controllers, and other related equipment.

3). Dimensions shall be legible from two permanent points of reference such as buildings and sidewalks.

4). Drawings shall be 24-inch by 36-inch minimum size.

d. Letter of notification to the County Public Health Dept. that reclaimed system will be activated.

3. Operation and Maintenance Manuals:

a. Provide complete operating and maintenance instruction manuals for equipment.

b. Provide in writing as part of the Water Management Program the controller settings for water under Best Management Practices No. 5 Handbook for all seasons. This service shall be performed by a certified water auditor and paid by the Contractor. This report shall identify designed controller setting for water discharge and actual installed discharged tested. The audit report shall also include the status of items indicated in paragraph 1.07.C based on final inspection and testing.

1.03 REFERENCES

A. American Society for Testing and Materials International (ASTM):

1. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

2. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

3. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

4. ASTM D2467 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

B. American Society of Mechanical Engineers International (ASME):

1. B36.10M - Welded and Seamless Wrought Steel Pipe.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with local, municipal, and state laws, rules, and regulations governing or relating to this Work. Wiring shall conform to National Electrical Code.

B. Best Management Practices: Conform to “Handbook Five: A Guide for Implementing Large Scale Irrigation Projects” as required by The California Water Conservation in Landscaping Act (Assembly Bill 325).

1. AB 325 California Calculation of Estimated Applied Water Use (EWU).

2. AB 325 California Calculation of Maximum Applied Water Allowance (MAWA).

C. Conform to California Code of Regulations, Title 23, Division 2, Chapter 2.7, Model Water Efficient Landscape Ordinance.

D. Manufacturer’s Instructions: The manufacturer’s instructions and detailed drawings shall be followed where the manufacturers of products and/or materials furnish installation details not indicated in the Drawings and Specifications.

E. Qualifications: Work shall be performed by skilled workers with a minimum of five years of experience in work of similar scope and complexity.

F. Designs and materials used shall conform to the Efficient Landscape Ordinance, AB 1881 water efficiency use requirements.

1.05 PRODUCT HANDLING

A. Do not damage materials during handling, loading, unloading, and storage of pipe and fittings. Store materials under cover, protect from direct sunlight. Transport materials in a manner to avoid undue stress on piping and other materials.

B. Do not install damaged materials or products into the Work.

1.06 PROJECT CONDITIONS

A. Before excavation, contact the "Underground Service Alert of Southern California" (USASC) for information on buried utilities and pipelines.

1.07 TESTING AND INSPECTION

A. Notify the Project Inspector 24 hours in advance of the pressure side piping inspection.

1. Pressure Side Piping: After welded joints have cured for at least 24 hours, lines flushed and outlets are capped, the system shall be tested under normal street water pressure for a minimum of 4 hours. Joints shall remain exposed for inspection during the pressure test. Center loading of piping with small loads of sand backfill to prevent arching or slipping under pressure is permitted.

2. Correct defective Work and repeat tests until the entire system is tested watertight.

B. Submit a request for a final inspection 48 hours in advance. Perform a coverage test to determine if the coverage of water to turf and planting areas is complete and adequate meeting the Efficient Landscape Ordinance, AB 1881 requirements.

C. Final Inspection: The following items shall be considered part of the final inspection:

1. Specified products and materials.

2. Irrigation coverage test, providing 100 percent head to head coverage.

3. Soils compacted in trenches and around sprinkler heads, level with existing grades.

4. Controller and cabinet installation (if applicable).

5. Sprinkler control valves and boxes.

6. Final site review shall include operating each system in its entirety in the presence of the Landscape Architect or Project Inspector.

7. Provide any required adjustments and correct defective Work as required.

8. A water audit review showing compliance with the Efficient Landscape Ordinance, AB 1881.

9. Irrigation Controller shall water only on days when allowed by the applicable city that governs watering days.

10. Proper signage stating that a reclaimed water irrigation system is in place and to not drink the water signs are posted as outlined by code.

1.08 TURN OVER MATERIALS

A. Extra Materials, Tools and Accessories:

1. Spare Sprinkler Heads: Furnish twelve spare sprinkler heads, with inserts for each type, size and series installed.

2. Keys and Wrenches:

a. Keys: Furnish two tagged pin tumbler type keys.

b. Wrenches: Furnish two sets for each type of sprinkler head or nozzle.

c. Coupler: Furnish a minimum of one quick coupler key (quill) and an additional key for every three quick-coupler valves installed.

B. Training:

1. Before starting a reclaimed irrigation project educate appropriate personnel about the relative safety of reclaimed water and explain the benefits of sustainability.

2. Review “As-Built” plans with Owner’s personnel and explain the following features: master valve, flow sensor, rain sensors, pump, backflow devices and locations of critical valves.

3. Provide an attendance sheet to the Owner listing all personnel trained.

1.09 WARRANTY

A. Provide a five-year manufacturer's warranty for controller units (if applicable).

B. Provide a one-year warranty for materials, fabrication, and installation, including restoration of planted or paved areas due to settlement of trenches.

PART 2 - PRODUCTS

2.01 IRRIGATION SYSTEM

A. Systems shall be automatic with electrically operated control valves.

B. Provide 100 percent head to head coverage or other required 100 percent configuration.

C. Point of connection (POC) for irrigation systems:

1. Use existing POC; no new POC for this Work.

D. No PVC piping of any kind will be permitted for above grade pressure lines.

E. Install isolation valves to avoid a total system shut down for maintenance and repairs. Include valves to isolate loop system and major branch lines (as applicable).

F. Irrigation System shall incorporate the following requirements:

1. The flow velocity shall not exceed five feet per second for pressure/lateral lines based on industry standard friction pressure loss values.

2. Pressure line pipe size shall be sufficient to support a minimum of two control valves operating at the same time, one valve opening while another is closing.

3. Gallons per minute demand and sprinkler head coverage shall follow the manufacturer's requirements.

4. Remote valves shall be sized no smaller than the piping it serves unless piping is increased in size to reduce friction loss. Remote valves shall then be sized no less than one pipe size smaller than the piping it serves.

5. Minimum pipe size shall be ¾ inch.

2.02 MATERIALS

A. Provide only new materials, of brands and types noted on Drawings and in the Specifications.

B. Plastic Purple Pipe and Fittings:

1. Pipe shall be extruded from compounds meeting (PVC1120) the requirements of Cell Classification 12454, as defined in ASTM D 1784, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Polyvinyl Chloride) (CPVC) Compounds.

2. Pipe shall be colored Purple

3. Pipe shall be marked with two print lines on opposite sides of the pipe. Both sides shall read “CAUTION RECLAIMED WATER – DO NOT DRINK” in intervals not to exceed 5 feet. Pipe shall also be marked with manufacturer’s name, nominal pipe size, Schedule, or Class. The UL, FM and NSF designations do not apply and are not printed on the reclaimed water pipes.

4. Plastic fittings: Schedule 40 molded from PVC Type I Compound, conforming to the requirements of specification ASTM D2466.

   a. Plastic Nipples: PVC schedule 80 conforming to ASTM D2467.

   b. Male Threaded Nipples: Schedule 80 only.

5. PVC primer and solvent for chemical weld of pipe and fittings shall be as recommended by pipe manufacturer. Containers for solvent and primer shall be clearly marked with manufacturer's data. Solvent and primer shall not be more than one year old. Blue or red-hot glue is not permitted.

   a. IPS Weld On P-70 primer.

   b. IPS Weld On 2711 (gray) cement.

C. Pipe and Fittings:

1. Connection between any female threaded fitting and plastic pipe shall be bridged with a Schedule 80 PVC nipple.

3. Brass Pipe: Seamless, 85 percent red brass, iron pipe sized, threaded.

4. Brass Fittings: Brass fittings shall be 250250 psi rated, threaded FS WW-P-460.

5. Copper pipe, fittings:

   a. Pipe: Type L rigid.

   b. Fittings: Wrought copper, solder joint type.

D. Valves:

1. Ball valves shall be bronze, full port threaded:

   a. Nibco T-580-70, or equal.

2. Quick coupler valves shall be all brass, 3/4 inch, with purple lock top or purple rubber vinyl cap:

   a. Rain Bird 44-LRC, or equal with locking vinyl cover.

   b. Quills shall be the same manufacturer as quick coupler valve, cast bronze, machine shank, stainless steel, or bronze lugs.

3. Coupler keys (quills) shall be from the same manufacturer as quick coupler valve; cast bronze with stainless steel or bronze lugs.

4. Electric remote-control valves shall be 24 volts normally closed solenoid actuated valves capable of operating on #14 gage UF wire; either bronze or brass, globe or angle pattern, and diaphragm actuated. Said Valves shall be marked in purple, identifying them as being installed in a Reclaimed Irrigation System.

   a. Superior 950 Series, or equal (bubblers/spray systems)

   b. Superior 960 Series with Rain Bird PRB-QKCHK-200M Pressure Regulating Basket Strainer (200 mesh / 40 psi) for Drip Line Systems

5. Manual sprinkler control valves are not allowed.

6. No hose bibs shall be installed in reclaimed water irrigation systems.

   a. Drip Zones - VB-STD w/VB-LOCK-H

E. Sprinkler Heads:

1. In planters and shrub areas, provide 12-inch plastic pop-up sprinkler heads with built in check and adjustable or fixed nozzles with diameter of coverage as indicated on drawings:

   a. Rain Bird 1812-SAM-PRS, or equal..

2. Install on triple swing assemblies: Swing joints assembled with PVC schedule 80 nipples and Marlex 90 degree “L” per irrigation details.

F. Root Watering System Tree Bubblers:

1. For trees, provide 2 – Root Watering Systems Bubblers for each tree.

   a. Rain Bird RWS-M-B-C-1402 Series, or equal.

G. Back Flow Protection Device:

1. Back Flow Devices:

   a. Febco LF825YA Reduced Pressure Backflow Preventer w/ regulator/strainer.

H. Water Meter (for use as Irrigation Sub-Meter):

1. Sensus SR-II, or approved equal

   a. Febco LF825YA Reduced Pressure Backflow Preventer w/ regulator/strainer.

I. Master Control Valve:

1. Superior 3200-100 series normally closed Master Valve

J. Flow Sensor:

1. Flomec QS-200-10 series Ultrasonic Flow Sensor (Sch 80 PVC tee)

K. Controller:

1. Hunter ‘ACC2’ A2C-1200-P+(2) A2<-600+A2C WIFI ‘Smart’ weather based Irrigation Controller in stainless steel enclosure / mounting pad.

L. Wireless Rain Sensor:

1. Hunter ‘Solar Synch’ WSS-SEN wireless rain sensor / ET sensor PVC tee

M. Tracer Wires:

1. No. 14, Green, Type TW plastic-coated copper tracer wire shall be installed with non-metallic irrigation main lines.

N. Control Wires to Control Valves:

1. Control wires to electrically operated solenoid valves shall be direct burial type UF#14 AWG copper, 3/64-inch-thick PVC coating. UL approved for Class 2 wiring for 24 volts, 60 cycle AC use UL recognized waterproof connectors to connect control wires to solenoids.

    1. Use UL recognized waterproof connectors to connect control wires to solenoids.

        a. 3M DBY, or equal.

O. Valve Boxes:

1. Rectangular valve boxes shall be provided with Purple Lid plastic 12-inch wide, 18-inch long, and 12-inch deep (outside dimensions) or larger as may be required to provide specified clearances.

    a. Rain Bird VB Series, or equal w/VB-LOCK-H..

2. Round valve boxes shall be provided with Purple Lid, 10-inch diameter by 10-inch high with locking cover.

    a. Rain Bird VB Series, or equal w/VB-LOCK-H..

3. Drip Zone valve boxes shall be provided with Purple Lid:

    a. Rain Bird VB-STD w/VB-LOCK-H.

4. Covers on valve boxes shall be vandal resistant, locking, and marked "NON-POTABLE WATER, DO NOT DRINK". Tops of boxes shall be set ½” above finish grade in turf, or 2 inch above grade in shrubbery or groundcover areas. The cover shall be identified with 2-inch high stenciled letters “RCV (with Station No.) BV for Ball Valve or QC for Quick Coupler. GV, QC, etc.”

P. Signs:

1. Install signs, in accordance with Title 22 requirements, at entrances stating the use of recycled water for landscape irrigation.

Q. Rain Sensor:

1. Hunter ‘Solar Synch’ WSS-SEM Wireless Rain Sensor / ET Sensor 80 PVC Tee

R. Drip Line Irrigation:

1. Emitters – Rainbird XFX-06-12 series

2. Air / Vacuum Release Valve:

a. Rain Bird ARV-050 air / vacuum release valve – 1 per zone at system high point.

3. Air / Vacuum Release Valve:

a. Rain Bird ARV-050 air / vacuum release valve – 1 per zone at system high point.

PART 3 - EXECUTION

3.01 CONNECTIONS TO SUPPLY

A. Source of water supply shall be as indicated on the Drawings; this is existing.

3.02 RECLAIMED PIPE INSTALLATION

A. Excavate trenches deep enough to provide earth coverage of 12 inches for non-pressure lines and 18 inches for pressure lines, from finished grades to top of pipe. Bottom of trenches shall be free of rocks, clods, and other sharp-edged objects. Below grade piping shall be installed on a firm sand bed for its entire length.

B. Plastic pipe and fittings shall be solvent welded. PVC pipe ends shall be cut ninety degrees and cleaned of all cutting burrs prior to cementing. Use approved reaming tool. Pipe ends shall be wiped clean with a rag and lightly wetted with PVC primer. Cement shall be applied with a light coat on the inside of the fitting and a heavier coat on the outside of the pipe. Pipe shall be inserted into the fitting and given a quarter turn to seat the cement. Excess cement shall be wiped from the outside of the pipe. The pipe will be tested as indicated in article 1.07.

C. Cure welded joints at least 15 minutes before moving or handling, and at least 24 hours before applying pressure to system, unless otherwise recommended by joint solvent manufacturer.

D. Irrigation piping installed under a driveway or sidewalk shall be sleeved. The sleeves shall be two pipe sizes larger than the piping.

E. Piping through cement and asphalt pavement shall be L type copper with ¼ inch of foam wrap or other required material around the pipe to allow for expansion.

F. Holes cored through walls shall be two pipe sizes larger to allow for foam wrap around pipe.

G. PVC pipes shall not be installed above grade unless reviewed by the Architect.

H. Reclaimed irrigation shall be installed below potable water lines.

I. Reclaimed water meters shall be set no closer than ten feet from a Potable water meter.

3.03 IRRIGATION HEAD INSTALLATION

A. Install sprinkler heads with 100 percent head to head coverage or other required 100 percent head to head coverage method where indicated.

B. To ensure proper coverage, spray heads and rotary heads shall be installed on separate control valves.

C. Install heads and or change heads, nozzles, or orifices as may be required to provide coverage.

D. Branch lines, swing joints or sprinkler risers shall not be sized smaller than the sprinkler heads inlet they serve.

E. Rotary Heads:

1. Prior to installing heads, thoroughly flush main and lateral lines with full line pressure. Repeat whenever system is opened for repairs or replacements. Start flushing operation at highest point of delivery and proceed to lowest.

2. Risers to rotary heads shall be installed plumb and secured in position with thoroughly compacted sand.

3. In new turf fields, rotary heads shall be temporarily set 3-inch minimum above grade and then lowered into permanent position as required.

4. Rotary heads in turf areas shall be provided with rubber tops.

5. Part circle rotor heads shall be adjusted to minimize spray water onto adjacent track or paving surfaces.

6. Adjust spray nozzles to minimize overspray and so entire system will be evenly balanced as required.

7. Install rotary heads on triple-swing joints assembled with PVC Schedule 80 nipples and Marlex 90-degree elbows.

8. Unless overspray or run off flows into the landscaping then overhead irrigation is not permitted within 24 inches of nonpermeable surfaces.

F. Pop-up Head Installation:

1. Pop-up head shall be installed flush with finished grade and 4 inches from edge of walks, and 12 inches from buildings to parking areas.

2. Install pop-up heads on triple-swing joints assembled with PVC Schedule 80 nipples and Marlex 90-degree elbows.

3.04 VALVE BOX INSTALLATION

A. Automatic control valves shall be enclosed in valve boxes of HDPE or polyolefin fibrous material, with locking lids.

B. Valve boxes shall be of sufficient size to provide no less than 1 1/2-inch of clearance on all sides of equipment installed within. The bottom section shall be slotted to extend below the pipe. Extensions shall be added as required to meet grade requirements.

C. Valve boxes installed in concrete or asphalt shall be set one inch below pipe and extensions shall be added as required to meet grade requirements. A homogeneous finished material shall surround valve boxes 4 inches below finished grade and match existing grade conditions.

D. Valve boxes shall be installed level to finish grade except in ground cover areas which shall extend 2 inches above finish grade.

E. Bottom of valve boxes shall be set level on four full size corner bricks on 2 inches of gravel bed.

F. Pea gravel shall be filled up to the bottom of the manual and remote valve and at least 4 inches of gravel inside of the valve box.

3.05 QUICK COUPLER VALVES AND ASSEMBLIES

A. Quick couplers shall be ¾-inch brass with one or two piece bodies and locking brass tops with purple rubber or vinyl covers.

1. Install next to walkways.

2. Top of quick coupler assembly shall be installed within 2 inches from bottom of yard box cover.

3.06 HOSE BIBS

A. Hose bibs are prohibited.

B. Where hose bib connections are required provide a quick coupler valve.

3.07 VALVES

A. ISOLATION AND SHUT-OFF VALVES

1. Pressure piping system shall be furnished with valves at points indicated on Drawings or specified.

2. Valves shall be installed with neat appearance and groupings, so parts are easily accessible. Valves near walks, curbs etc., to be set in 12 inches and parallel to the adjacent surface. Remote control valves shall be installed in ground cover or shrub areas wherever possible.

3. Valves shall be full size of line in which they are installed unless otherwise indicated.

B. Remote Control Valves:

1. Remote control valves shall be low wattage (24 volts,) and shall be capable of operating properly on no larger than 14 gage UF wire.

2. Remote control valves shall be adjustable to control flow of water through valve adjustments and shall be accessible through valve boxes installed above each valve. Valves shall be highest quality of manufacturer.

3. Remote control valves shall be installed and adjusted so that sprinkler heads operate at pressure recommended by head manufacturer. Remote control valves shall be adjusted so that sprinkler heads to planting areas from each individual valve system applies a uniform distribution of water.

4. Remote control valves on any line shall be installed 3 inch minimum, 8 inch maximum below finish grade to top of flow control stem.

5. Remote control valves shall be installed with schedule 80 PVC nipples on each side of the valve.

6. Valves for lawn and shrub areas shall be installed within the perimeter of the area it serves. The location shall be accessible within 12 inches from curb or sidewalk and installed in a location to avoid wetting the person operating the valve manually.

3.08 CONTROLLER, CLOCK AND ENCLOSURES

A. All controllers are existing on the site and to be used for new Work.

3.09 COVERAGE TEST

A. When sprinkler system has been completed, perform a coverage test to determine if coverage of water to turf and planting areas is complete and adequate.

B. Adjust, add heads, change heads, nozzles or orifices as may be required to provide complete coverage and provide layout indicated on Drawings.

3.10 CONTROL WIRE

A. Mainline control wires shall be taped together at five-foot intervals with black electrical tape, then laid parallel to pressure line with 18 inches minimum cover to finish grade.

B. Control wiring located under paved areas shall be encased in Schedule 40 PVC pipe and shall extend a minimum of 12 inches beyond pavement.

C. Wires shall be color coded, white for common ground wire, red or black for valve control wires.

D. Wire splicing shall only be performed in controller cabinet and at remote control valve boxes. Splices shall be made with a mechanical connector equal to Spears Dry Splice

Wire Connectors and encased in epoxy resin to provide a permanent watertight connection.

E. Stubbed out control wires shall terminate in concrete yard boxes.

F. Wire passing under future or existing paving or structures shall be encased in Schedule 40 PVC pipe extending at least 12 inches beyond edges of the paving or structure.

3.11 PRESSURE TEST

A. After welded joints have cured at least 24 hours and before sprinkler heads are installed, flush out lines and cap outlets. Test system under normal street water pressure, in presence of the Project Inspector.

B. Joints shall remain exposed for examination during pressure test. Center load pipe with small amount of sand to prevent arching or slipping under pressure. Use normal street water pressure for test. Maintain pressure on plastic pipe for not less than four hours.

C. Replace or repair system, including joints that fail during pressure test. Repeat pressure testing until entire system passes the test period without leaks.

3.12 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.13 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site. Hard surfaces shall be washed clean. Daily clean up shall be required on areas used for circulation, parking, or other use.

END OF SECTION

SECTION 32 90 00

LANDSCAPE PLANTING

PART 1 - GENERAL

1.01 SUMMARY

A. Work Specified in this Section: Furnish all labor, material, equipment and service necessary to provide all landscape planting, complete and in place, as shown and specified herein, including soil preparation, planting, sodding, staking, guying, and clean-up.

B Related Work Specified in other Sections:

1. Section 32 80 00 – Irrigation System
2. System 32 90 70 – Landscape Establishment and Maintenance

1.02 SUBMITTALS

A. Plant Materials

1. Submit documentation to the Owner Authorized Representative within forty-five (45) calendar days after date of award of Contract that all plant material is available. Include schedule of nursery review visits anticipated to allow all materials to be approved one month prior to delivery. The Contractor shall be responsible for all material listed on plant list. Any and all substitutions due to availability shall be requested in writing prior to confirmation of ordering. All materials shall be subject to observation by the Owner Authorized Representative at any time after confirmation of ordering. The Owner Authorized Representative will confirm plant material not available and then make alternate selections.

2. Plants shall be subject to observation and preliminary acceptance by the Owner Authorized Representative at place of growth or upon delivery for compliance with these specifications.

3. Such observation shall not impair the right of observation and rejection during progress of the work. Tagging or approval of plant material is for design intent only and does not constitute the Owner Authorized Representative approval of the plant materials in regards to their health and vigor. The health and vigor of the plant materials is the sole responsibility of the Contractor. Submit written request for observation of plant material at place of growth to the Owner Authorized Representative. Written request shall state the place of growth and quantity of plants to be observed. The Owner Authorized Representative reserves the right to refuse observation at this time if, in his judgment, a sufficient quantity of plants is not available for inspection.

4. Prior to approving plant materials the Contractor shall submit color photos of the actual plant materials as indicated on the drawings from the actual nursery stock as sourced by the contractor for the project. Photos to be labeled with source, height, spread, and caliper. Photos to include either a clearly legible calibrated measuring rod or adult person present and adjacent to the plant to indicate scale. At Owner Authorized Representative's discretion, additional photographs showing all four (4) sides of a specimen shrub, tree or palm may be required. Upon approval of photos Trees will be inspected at the nursery source. Shrubs, vines, groundcovers may be reviewed at the nursery source or on site as determined by the Owner Authorized Representative.

5. For contract-grown materials contractor shall submit contract growing nursery's name to the Owner Authorized Representative for approval prior to start of contract growing activity. It shall be the Contractor's responsibility to coordinate any contract growing activities so as to meet the approved construction schedule requirements. All cost associated with contract growing shall be the Contractor's responsibility.

B. Materials and Products:

1. Provide 3 copies of manufactures specifications and catalogue cut sheets of all specified products for approval, including but not limited to all agricultural amendments, turf seed, sod, and tree staking and guying materials.

2. Owner will provide base line agronomic soils test from existing on site planting soils for bid purposes only. Prior to planting operations provide additional Agronomic soils samples and report for soil suitability and fertility with written recommendations for owner's approval. Samples and report to include:

   a. All soils testing for planting areas to be tested by: Wallace Laboratory 365 Coral Circle, El Segundo, CA 90245 – Phone 310-615-0116 or equal as prior approved by Owner Authorized Representative.

   b. Agronomic soil test to be taken for each Block at top 6-8 inch depth and at 36 inch depth. Provide a separate composite sample of each depth for a minimum total of 3 each surface samples and 3 each 36 inch depth samples for each Block area.

   c. Contractor to pay for all planting areas soil testing required.

   d. Contractor to provide site plan indicating location of all samples areas.

3. Provide weed control program to maintain the site weed free including schedule, methods and materials to be used.

1.03 QUALITY ASSURANCE

A. All plant material shall be tagged, and or selected and approved by Owner Authorized Representative 3 month prior to installation.

B. Plants shall be subject to observation and preliminary acceptance by Owner Authorized Representative.

C. Provide an onsite area approved by the Owner Authorized Representative that will be used to approve all site mock-ups to include but not limited to Soil preparation, tree planting, tree staking and guying, finished grading, shrub planting, groundcover planting, turf and mulch installation. The approved site mock up will become the basis of the site quality control and approvals. Any changes to the agreed and approved mock up must be done in writing.

D. Required observations are listed below:

1. Materials:

   a. All plant material shall be observed and approved by Owner Authorized Representative, size and variety prior to installation. Such approval shall not impair the right of observation and rejection during the progress of work

for size and condition of ball or root mass, latent effects, diseases, pests or injuries.

b. If any defective or non-complying plants are found during observations, they will be rejected and replaced at no cost to owner.

c. All rejected plant material shall be removed from the site within a minimum of two working days.

d. The Owner Authorized Representative reserves the right to take and analyze samples of materials for compliance with these specifications at any time. Rejected materials shall be immediately removed from the site at the Contractor's expense. Cost of testing of materials not meeting these specifications shall be paid by Contractor.

2. Workmanship: Finish grading and soil preparation before installation of plant material.

a. During this observation the Owner Authorized Representative may request that samples of the prepared soil be analyzed by an approved laboratory to assure its compliance with specifications.

b. Notification of exception shall be for the Contractor to correct deficiencies in the soil preparation to render it in compliance with these specifications. Corrections shall be made prior to any planting, or, at the Owner Authorized Representative's option, the installation of trees may proceed if the corrections can be made later without affecting the quality of the work. The Contractor shall notify the Owner Authorized Representative in writing when the deficiencies have been corrected.

E. Certifications:

1. Submit a certificate of delivery slip with each delivery of material in containers or in bulk. Certificates shall state source, quantity, or weight, type and analysis and date of delivery. Materials which are not pre-packaged shall have analysis completed by an approved independent testing laboratory. Deliver all certificates to the Owner Authorized Representative prior to installation, incorporation or application of the material.

a. Quantities of fertilizer.

b. Quantities of soil amendments.

c. Quantities of mulch.

F. Protection and temporary erosion control.

1. Protect all existing sub drainage systems in place. Repair or replace any damaged systems caused by planting operations as approved by the Owners Authorized Representative.

2. Maintain all existing tree protection in place until authorized for removal.

3. Maintain temporary fences and barriers to limit access to planting areas from vehicular and pedestrian compaction.

4. As required provide and maintain silt fences and sand bags to eliminate site erosion and offset mud and debris run off during planting operations.

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Deliver fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade mark, and compliance with all applicable laws.

2. Deliver all plant blocks and trees with legible identification labels.

   a. State correct plant name and size as indicated on plant list.

   b. Use durable waterproof labels with water-resistant ink which will remain legible for at least 60 calendar days.

3. Protect plant materials during delivery to prevent damage to root ball, trunk, crown, branches, leaves, and fronds.

4. The Contractor shall notify the Owner Authorized Representative fourteen (14) calendar days in advance of delivery of all plant materials and shall submit an itemized list of the plants in each delivery.

5. Coordinate all deliveries with supplier, and with construction schedules. Provide adequate labor and experience personnel, and equipment to handle off loading, storage and handling of plant material.

6. Maintain ongoing record of all plant materials delivered to site and materials that have not been received for Owner Authorized Representative review.

B. Storage:

1. Store plant materials in area approved by Owner. Provide shade covering if required by plant material species. Protect all plant materials from weather extremes. Allow stored materials adequate space for air circulation, and to eliminate damage.
2. Do not delivery more material on site than can be planted, stored, secured or maintained on a weekly basis.
3. Maintain and protect plant materials not to be planted within four (4) hours in a healthy, vigorous condition.
4. Provide ongoing watering to all plant material delivered to the site. Maintain all plant materials with moist root balls.

C. Handling: The Contractor shall exercise care in handling, loading, unloading and storing of plant materials. Plant materials that have been damaged in any way shall be discarded and if installed, shall be replaced with undamaged materials at the Contractor's expense.

1.05 PROJECT CONDITIONS

A. Perform actual planting only when weather and soil conditions are suitable and will not be detrimental to the plant material.

1.06 SCHEDULING

A. Prior to commencement of landscaping work, the Contractor shall arrange a conference at the site with the Owner Authorized Representative. The conference shall include the Contractor, the Superintendent appointed to oversee the work of this Section and the Owner Authorized Representative. At least eight (8) working days notice shall be given prior to the conference. The Contractor shall prepare a schedule of work items, and work sequence shall be reviewed at the conference.

B. The following are the key planting reviews to be scheduled with the Owner Authorized Representative for approval of the installation.

1. Tree planting installation prior to shrub planting
2. Tree staking and guying
3. Finished grading and drainage prior to shrub planting to insure all flow lines to inlets are established
4. Irrigation coverage test prior to shrub planting
5. Weed control prior to shrub, ground cover and turf planting
6. Shrub layout and planting
7. Turf and Ground cover layout
8. Mulch installation. (In some cases mulch may be applied prior to groundcover installation if grading is approved)
9. Final tree and shrub pruning
10. Final irrigation installation review
11. Final acceptance of the work

1.07 WARRANTY

A. All plant material installed under the Contract shall be guaranteed against any and all poor, inadequate or inferior materials and/or workmanship. Guarantee all Trees and palms for (1) one year and all shrubs and groundcover (90) ninety days from the project completion date and final acceptance of the work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. The following soil amendments and fertilizers are to be used for bid price basis only. Specific amendments and fertilizer specifications will be made prior to planting operations.

B. All materials shall be of standard approved and first-grade quality and shall be in prime condition when installed and accepted. Any commercially processed or packaged material shall be delivered to the site in the original unopened container bearing the manufacturer's guaranteed analysis. The Contractor shall supply the Owner Authorized Representative with a sample of all supplied materials within fourteen (14) days after award of contract, accompanied by analytical data from an approved laboratory source or bearing the manufacturer's guaranteed analysis. The Contractor shall supply the Owner Authorized Representative with a sample of all supplied materials within fourteen (14) days after award of contract, accompanied by analytical data from an approved laboratory source or bearing the manufacturer's guaranteed analysis. Amendments may be modified based on analysis provided.

C. Organic Amendment: Types of acceptable products are composts, manures, mushroom composts, straw, alfalfa, peat moss, etc., low in salts and heavy metals, free from weed seeds, pathogens and other deleterious materials as approved by agronomic soils report. The compost shall be aerobic without malodorous presence of decomposition products.

1. Humus material with an ash content of not less than 8% and not more than 50%.
2. The pH shall be between 6 and 7.5.
3. Salt content shall be less than 10 milliohm/cm at 25°C (Ece less than 10) in a saturated paste extract. The maximum rate of application shall not exceed 15% by volume unless the salinity is lower than 10 milliohm/cm at 25°C.
4. Boron content of the saturated extract shall be less than 1.0 parts per million.
5. Silicon content (acid-insoluble ash) shall be less than 20%.
6. Calcium carbonate shall not be present.
7. Carbon: nitrogen ratio shall be less than 20:1.
8. Approved organic amendments and suppliers include;

    a. Composted & Washed Steer Manure, as supplied by Earth Works, Tel: (909) 270-0088
    b. Hydro Blend, as supplied by Aguinaga Fertilizer Co., Tel: (949) 786-9558.
    c. Peat: Milled Canadian Sphagnum peat; light brown and fibrous without excessive sticks, with a pH of 4 to 6 or Owner-approved equivalent.

D. Soil Amendments:

1. Soil Sulfur: Agricultural grade sulfur containing a minimum of 99% sulfur (expressed as elemental).
2. Iron Sulfate: 20% Iron (expressed as metallic iron), derived from ferric and ferrous sulfate, 10% sulfur (expressed as elemental).
3. Calcium Carbonate Lime: 95% lime as derived from oyster shells.
4. Gypsum: Agricultural grade product containing 98% minimum calcium sulfate.
5. Dolamite Lime:

    21% calcium
    11% magnesium

E. Fertilizer:

1. Planting Fertilizer: Pelleted or granular form shall consist of the following percents by weight and shall be mixed by commercial fertilizer supplier:

    6% nitrogen
    20% phosphoric acid
    20% potash

F. Herbicide: Roundup Extended Control Weed & Grass Killer Plus Weed Preventer. Manufactured by The Scotts Company, www.scotts.com or approved equal. Contractor to provided weed control program to maintain site weed free for Owner approval.

G. Plant Material:

1. Plants shall be in accordance with the California State Department of Agriculture's regulation for nursery inspections, rules and rating. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous and free of insect infestations, plant diseases, and sunscalds, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements. Tree trunks shall be sturdy and have well 'hardened' systems and vigorous and fibrous root systems which are

not root or pot-bound. In case the sample plants inspected are found to be defective, the Owner Authorized Representative reserves the right to reject the entire lot or lots of plants represented by the defective samples. Any plants rendered unsuitable for planting because of this inspection shall be considered as samples and shall be provided at the expense of the Contractor.

2. The size of the plants shall correspond with that normally expected for species and variety of commercially available nursery stock or as specified on drawings. The minimum acceptable size of all plants measured before pruning with the branches in normal position, shall comply with the measurements, if any, specified on the drawings in the list of plants to be furnished. Plants larger in size than specified may be used with the approval of the Landscape Architect, but the use of larger plants shall not change the contract price.

3. All plants not in compliance with the requirements herein specified, will be considered defective and such plants, whether in place or not, shall be marked as rejected and immediately removed from the site of the work and replaced with new plants at the Contractor's expense. The plants shall be of the species, variety, size, and conditions specified herein or as shown on the drawings. Under no conditions shall there be any substitutions of plants or sizes listed on the accompanying plans, except with the express consent of the Owner Authorized Representative.

4. Pruning: At no time shall trees or plant materials be pruned, trimmed or topped prior to delivery and any alteration of their shape shall be conducted only with the approval and when in the presence of the Owner Authorized Representative.

5. Plant material shall be true to botanical and common name and variety as specified in "Sunset Western Garden Book" (current edition).

6. Acceptable Nursery Suppliers;

   a. San Marcos Growers

   b. Normans Nursery

   c. Senna Tree Company

   d. Sunny Slope Trees

   e. Boething Treeland

   f. Monrovia Nursery

7. Nursery Grown and Collected Stock:

   a. Plants shall be grown under climatic conditions similar to those in locality of project.

H. Guying and Staking Materials:

1. Wood Tree Stakes: Lodge pole pine fully treated with Coppernapthanate Wood Preservative in strict accordance with Federal Spec. TT-W-572 Type 1 Composition B, 2" min. nominal size diameter x 10' long, no split stakes.

2. Ties: "Cinch-Tie" - 24" (<24" box), 32" (24" box and larger); black virgin flexible vinyl meeting ASTM-D-412; with double back locking configuration; galvanized roofing nail. Manufactured by V.I,T. Products, San Diego CA 760/480-6702

3. Guying Hardware:

   a. "Duck Bill" anchoring system as manufactured by Foresight Products LLC, Commerce City, CO, 80022, (303) 286-8955 or approved equal.

      (1) For trees up to 3" (75 mm) diameter use:

Model 40 Duckbill Anchors with 12 feet (3.6 m) of cable attached to each anchor, 3 tree collars, and 3-1/16" (1.6 mm) cable clamps - all pre-assembled. Each anchor holds 300# (135 kg).

(2) For trees up to 6" (150 mm) diameter use:

Model 68 Duckbill Anchors with 13 feet (4.0 m) of cable attached to each anchor with a turnbuckle in line, 3 tree collars, and 6-1/8" (3.2 mm) cable clamps - all pre-assembled. Each anchor holds 1,100# (500 kg).

(3) For trees up to 11" (280 mm) diameter use:

Model 88 Duckbill Anchors with 15 feet (4.5 m) of cable attached to each anchor with a turnbuckle in line, 3 tree collars, and 6-3/16" (4.8 mm) cable clamps - all pre-assembled. Each anchor holds 3,000# (1,360 kg)i.

b. Palm anchoring system as manufactured by Platypus Anchoring Systems, 1902 Garner Station Blvd., Raleigh, NC 27603 (866) 752-8478 www.platipus.us or approved equal.

I. Water: Furnished by Owner, transport as required

2.02 Mulch:

1. "Gorilla Hair" Shredded redwood mulch as supplied by Earth Work Soil Amendment Inc., 1725 Agua Mansa Road, Riverside, CA 92509 Tel: 951-782-0260, www.ewsa.com or approved equal. Provide 3” depth in all planted areas except turf areas.

2.03 Metal Header:

1. Provide metal header between turf and shrub area.

2. Headers shall be 'Permaloc Aluminum Edging' 3/16" x 5 1/2", Black Anodized-electrically absorbed dyes into the outer layers of the aluminum, 16"-0" sections with stake loops every 24" along the section, 0.110" for 3/16" gauge wall thickness; and to include eight (8)-12" aluminum stakes (see drawings for lengths). Stakes are to be 6061 alloy, T-6 hardness. Manufactured by Permaloc Corp. 1-800-356-9660.

3. Headers shall be furnished as shown on the drawings and herein specified. They shall be laid true to line and grade and in a workmanlike manner. Care shall be exercised in laying headers to project adjacent improvements, shrubbery and other properties from damage. All stakes shall be placed on ground cover side of headers. Install per details and manufacturers recommendations.

2.04 Jute Mesh:

1. Mesh shall be "Anti-Wash Geojute" by Pacific Soil Stabilization, 800/473-1965, or approved equal. Install per manufacturer's specifications and recommendations. Material to be used for slopes 2:1 or grater.

PART 3 - EXCUTION

3.01 EXAMINATION

A. Prior to planting operations insure site has been graded to final levels, grading swales established, and the site is free of all roots, weeds and debris. Provide for inclusion of all amendments per approved soils report, settling, etc. Contractor shall be responsible for shaping all planting areas as indicated on grading plans or as directed by the Owner Authorized Representative.

B. Inspect trees, shrubs and liner stock plant material for injury, insect infestation and trees and shrubs for improper pruning.

C. Do not begin planting of trees until deficiencies are corrected or plants replaced.

3.02 PREPARATION

A. Soil Preparation

1. Maintain the site weed free.

2. After approximate finished grades have been established, soil shall be conditioned and fertilized in the following manner. Soil should be slightly damp, but not muddy during rot tilling.

a. Prior to amending, compacted surface soil (Soil compacted greater than 85%) shall be cross ripped to a minimum 18 inch depth, or alternative method use power shovels to break and turn over the soils . (Except at existing tree drip lines as determined in the field by the Owner Authorized Representative)

b. The following shall be uniformly broadcast and blended into the top six (6) inch depth of soil:

Application rates given are per 1000 sq. ft.:

(1) Organic amendment: 2 cu. yd. sufficient for about 3% to 5% soil organic matter –for all planting areas.

(2) Ammonium sulfate (21-0-0) 5 lb. – for all planting areas

(3) Potassium sulfate (0-0-50): 10lb. - for all planting areas expect baseball field turf area.

(4) Triple superphosphate (0-45-0): 4 lb. – for all planting areas

(5) Agricultural gypsum - 10 lbs.

3. At time of planting, the top two inches of all areas to be planted or seeded shall be free of stones, stumps, earth clods, or other deleterious matter 1" in diameter or larger, and shall be free from all plastic, wire, plaster, obvious foreign matter or similar objects that would be a hindrance to planting or maintenance. The top 24" of soil shall be free of all stones, stumps or other deleterious matter 3" in diameter or larger.

B. Final Grades:

1. Bring soil to grades as indicated per Civil Engineer Grading Plan. Provide additional soil for any low points, or settlements found, or remove soil at high points.

2. Finish grading shall insure proper drainage of the site as determined by the Owner Authorized Representative. Flow finished grades from high point to low point with not abrupt change in grade.

3. All areas shall be graded so that the final grades will be 1" below adjacent paved areas, sidewalks, valve boxes, headers, tree well grates, planter rims, clean-outs, drains, manholes, etc., or as indicated on plans for turf, and1 1/2" for shrubs and ground covers.

4. Surface drainage shall flow away from all building foundations.

5. Eliminate all erosion scars prior to commencing maintenance period.

6. Compact all soil in planting areas to final grades: min. 80% to max. 85% unless otherwise required by soils report or for structural reasons. Soils found over compacted in planting areas to be re-ripped or tilled as required. The intent is to allow a shovel to be inserted without effort into the soil at any planting location. Ripping soil can be accomplished by hand shovel, ripping teeth on front end loader or other mechanical means.

C. Disposal of Excess Soil: Dispose of any unacceptable or excess soil at an off-site location approved by the Owner.

3.03 INSTALLATION

A. General:

1. Actual planting shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice as approved by the Owner Authorized Representative.

2. Only as many plants as can be planted on that same day shall be distributed in a planting area. All plants shall be watered within 2 hours of planting.

3. Containers shall be opened and plants shall be removed in such a manner that the ball of earth surrounding the roots is not broken and they shall be planted and watered as herein specified immediately after removal from the containers. Containers shall not be opened prior to placing the plants in the planting area.

B. Pre-Plant Weed Control:

1. After soil preparation, irrigate and fertilize all planting areas for approximately 14 calendar days to achieve weed germination.

2. If live weeds exist on site after irrigating and at the beginning of work, apply Roundup as per manufacturer recommended or approved equal weed control application by an approved licensed landscape pest control advisor and applicator to ensure the site is weed free and the pervious hydroseeding seeds has been killed prior commence the work.

3. Clear and remove all weeds by grubbing off all plant parts at least 1/4" below the surface of the soil to be planted.

4. Repeat process as necessary, or as directed by the Owner Authorized Representative.

5. Do not plant until herbicide manufacturer indicates planting will not be affected by herbicide residue.

6. Maintain site weed-free at all times. Degree of acceptability shall be solely determined by Owner Authorized Preventative.

C. Lay-out of Major Planting:Locations for container plants shall be spotted and outlines of ground cover areas to be planted shall be marked on the ground by the Contractor before any planting or excavation begins. All such locations shall be approved by the Owner Authorized Representative. Layout shall be accomplished by setting container plants or grade stakes with plants identified in locations indicated on plans, and with painted lines for ground cover areas. If underground construction or utility lines are encountered in the excavation of planting areas, other locations for planting will be selected as approved by the Owner Authorized Representative.

D. Planting of Trees and Shrubs:

1. Layout all trees for Owner Authorized Representative approval prior to shrub or ground cover planting. All trees to be planted prior to installation of shrubs and groundcovers.

2. Excavate planting pits at twice the diameter of root ball with roughened surfaces as per planting detail and approved mockup.

3. The top of the root ball should be slightly above final grade. Drainage shall flow away from plant root crown. Trees or shrubs found too high or low will be re-planted to correct grade at no additional cost to owner.

4. Backfill planting excavation for trees and shrubs with the following amended soil for centrally mix top soil source at the following rate per cubic yard: Specific backfill requirements may vary based on recommendations from Soil Analysis.

   a. Rates are for each cubic yard of soil:

      (1) Organic amendment:15% approved organic amendment

      (2) Commercial Fertilizer: Single superphosphate (0-20-0) 1/4 lb: potassium sulfate (0-0-50) - 1/3 lb

      (3) Agricultural gypsum: 1 lb.

      (4) Urea formaldehyde: 1/2 lb. of Ureaformaldehyde (38-0-0) per cu. yd. of blended soil.

5. Construct a two (2") inch water beam on the outside edge of root ball.

6. Planting pits shall be backfilled with amended soil mix in 12” layers to insure even backfill without air pockets. In addition water jet and tamp soil during backfill operations to remove all air pockets.

7. Excess soil generated from the planting holes and not used as backfill or in establishing the final grades shall be removed from the site.

8. Protect all areas from excessive compaction when trucking plants or other material to the planting site. Cross rip all compacted areas to an 18 inch minimum depth and re-till to 6” depth.

9. Center plant in pit or trench.

10. Face plants as directed by Owner Authorized Representative.

11. Set plant plumb and hold rigidly in position until soil has been placed firmly around ball or roots.

12. Container plants on-structure shall be backfilled with on structure planting mix.

13. All plants which settle deeper than the surrounding grade shall be raised to the correct level.

14. Box Removal: Remove bottom of plant boxes before planting. Remove sides of box without damage to root ball after positioning plant and partially backfilling.

15. Pruning: Pruning may not be done prior to delivery of plants. At the end of all planting operations provide certified arborist to prune and shape all trees as directed by the Owner Authorized Representative.

16. Staking and Guying: Staking and guying of trees as directed by the Owner Authorized Representative shall be completed immediately after planting. All stakes shall be installed plumb and as indicated on the drawings.

E. Planting of Groundcovers:

1. Flat grown plants shall remain in those flats until transplanting. The flat's soil shall contain sufficient moisture so that it will not fall apart when lifting the plants.

2. Groundcover shall be planted in straight rows and evenly spaced, unless otherwise noted, and at intervals called out in the drawings. Triangular spacing shall be used unless otherwise noted on the drawings.

3. Each rooted plant shall be planted with its proportionate amount of flat soil. Plantings shall be immediately sprinkled after planting until the entire area is soaked to the full depth of each hole.

4. Care shall be exercised at all times to protect the plants after planting. Any damage to plants by trampling or other operations of this Contract shall be repaired immediately.

F. Mulch Cover: All groundcover, perennial, and annual beds to be dressed with 3" deep layer of mulch. Keep mulch clear of root crown of shrubs and trees. Hedges shall be mulched the fill width of the hedge bed. Contain mulch within landscape borders. A mulch ring for all newly planted trees shall be provided at least five feet in diameter and spaced at least six inches away from the tree trunk.

G. Turf: Install turf after finished grades and amendments have been established and irrigation coverage test has been accepted. Lay sod in straight, parallel rows to form a solid mass with tightly fitted joints, without overlap. Stagger strips to offset joints. Work topsoil into minor cracks. On 1:3 slope or greater, lay sod with long dimension of pad parallel to contour and stake sod as necessary to stabilized. Drive sod stakes flush with top of sod.

3.04 CLEANING

A. The Contractor shall leave the site area broom-clean daily leaving the premises in a clean condition. All walks shall be left in a clean and safe condition.

B. After all planting operations have been completed; remove all trash, excess soil, empty plant containers and rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout the site. The Contractor shall pick up all trash resulting from this work no less frequently than each Friday before leaving the site or the last working day of each week. All trash shall be removed completely from the site.

3.05 SCHEDULES

A. When observations are conducted by someone other than the Owner Authorized Representative, the Contractor shall show evidence in writing of when and by whom these observations were made.

B. No site visits shall commence without all items noted in previous Observation Reports either completed or remedied unless such compliance has been waived by the Owner. Failure to accomplish punch list tasks or prepare adequately for desired observations shall make the Contractor responsible for reimbursing the Owner Authorized Representative at his current billing rates per hour (plus transportation costs). No further observations shall be scheduled until this charge has been paid and received.

3.06 ACCEPTANCE AND MAINTENANCE

A. At completion of planting maintain all areas until final acceptance of the contract with all punch list items completed and accepted.

B. Replace any dead or damaged plant material, re-establish disturbed groundcovers or sod areas as determined by Owner Authorized Representative. At completion of the contract determine the date of acceptance and start of the extended maintenance period based on owner's acceptance of the work. See Maintenance sections for all maintenance requirements.

END OF SECTION

SECTION 32 90 70

LANDSCAPE ESTABLISHMENT & MAINTENANCE

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 01 apply to this section.

B. Work Included: Provide all labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations of the work of this Section, complete, as shown on Drawings or specified herein. Work includes, but is not necessarily limited, to the following:

1. 60-Calendar Day Plant Establishment Period.

2. 60-Calendar Day Maintenance Period.

3. This period of work shall commence upon acceptance by Owner's Authorized Representative of all basic installation work and the acceptable completion of all Punch List corrections by Owner's Authorized Representative.

C. Related Work Specified in other Sections:

1. Specification Section 32 80 00 – Irrigation System.

2. Specification Section 32 90 00 – Planting.

1.02 QUALITY ASSURANCE

A. Materials: All materials used shall conform to Specifications. Submit a monthly record of all herbicides, insecticides and disease control chemicals, if approved for use by Owner's Authorized Representative and Owner.

B. Herbicides shall be applied by licensed personnel when air currents are still to prevent herbicide drift onto adjoining property and non-target planting, if approved by Owner's Authorized Representative and Owner.

C. Complete schedule of Maintenance Operations including dates shall be submitted by Contractor indicating all maintenance operations, expected materials and equipment and schedules for review and approval by Owner's Authorized Representative. Advance notification of all maintenance operations shall be submitted 48 hours prior to each of the operations by Contractor.

1. "Specialty Type" maintenance operations are defined as fertilization, pre-emergent applications of herbicides.

D. Contractor to provide Certified Arborist to accomplish all pruning operations.

1. Certified Arborist to be approved by Owner's Authorized Representative.

1.03 SUBMITTALS

A. Résumé and qualifications of Contractor's Site Representative and Foreman indicating experience with maintenance of project planting for approval by Owner’s Authorized Representative.

B. Résumé and qualifications of Certified Arborist to Owner’s Authorized Representative for review and approval.

C. Written schedule of daily, weekly and monthly maintenance programs and operations including equipment, products and expected personnel on site.

D. Bi-monthly maintenance records:

1. List of all fertilizers, amendments etc. used.

2. List of all corrective action or replacement of work performed.

3. List of all operations performed (weeding, irrigation, etc.) including date and times.

E. Prior to beginning maintenance submit final lists of amendments and soil preparation materials installed in each site soil area as determined by the approved Agronomic Soil Test results for planting areas.

1. Review lists with Owner’s Authorized Representative and use these for determining schedules of operations and materials list for establishment and maintenance.

PART 2 - PRODUCTS

2.01 GENERAL

A. Materials used shall conform to Specifications, or shall otherwise be acceptable in accordance with Specifications.

2.02 SOIL REPORT

A. In addition to the Contract Documents, comply with the recommendations of the approved Soils Analysis Report.

2.03 AMENDMENTS/PRODUCTS

A. Refer to Specification Section 32 90 00 – Planting and the Agronomic Soils Report and recommendations.

PART 3 - EXECUTION

3.01 PLANT ESTABLISHMENT

A. Plant Establishment Period shall be for a period of 60 calendar days and shall be completed before recommendation substantial acceptance of the work.

B. Plant Establishment Period will be extended beyond the specified period when plantings have not reached establishment in accordance with Specifications. Any decisions regarding adequacy of plant establishment shall be determined in accordance with Specifications and locally accepted practice.

C. Trees, shrubs and ground cover at completion of the establishment period shall not show evidence of die-back.

D. Trees, shrubs and ground cover which are dead or show evidence of die-back shall be replaced with new, vigorous, healthy plants by Contractor.

E. All areas shall be free of weed species. Weeds that germinate must be removed by grubbing or spot application of contact herbicide immediately. Great care must be taken not to damage plants.

3.02 MAINTENANCE

A. General:

1. Maintenance Period shall extend for 60 calendar days from the date of substantial acceptance of the work ending the Plant Establishment Period.

2. During the specified Maintenance Period, the project will be made available for Owner's use. Contractor shall conduct his maintenance operations in such a manner as to minimize inconvenience to occupants and the public.

3. It is the intent of this Section to provide a level of maintenance that will present a pleasing and desirable appearance at all times. Leaves, paper, weeds and other debris shall be removed from landscaped areas and legally disposed off site by Contractor.

4. A Post-Maintenance Period Observation shall be conducted at the end of the Maintenance Period.

3.03 SHRUB AND GROUNDCOVER MAINTENANCE

A. Maintain all planting areas in a weed-free condition.

B. Shrubs shall have a natural appearance and not be trimmed into balled or boxed forms.

1. Prune shrubs under direction of Owner’s Authorized Representative.

3.04 IRRIGATION

A. Provide and monitor adequate irrigation by hand or other means to establish vigorous plant establishment and growth in accordance with the requirements of each plant species.

3.05 AUTOMATIC IRRIGATION SYSTEM MAINTENANCE

A. Maintain the complete irrigation system in an operable manner.

B. Repair and adjust all sprinkler heads to maintain proper coverage, including adjustment of heads to proper height.

C. Adjust irrigation and hand water application to compensate for changes in weather. Assume responsibility for damages, which occur due to under-watering or over-watering. Immediately replace plants that are dead or unacceptable with original type material.

D. Repair or replacement of equipment damaged as a result of Contractor's negligence shall be replaced at Contractor's expense within one watering period.

E. Damage not resulting from Contractor's negligence shall be reported promptly to Owner’s Authorized Representative together with an estimate of costs for correction of the condition. Contractor will be reimbursed the wholesale cost of vandalized materials and parts upon presentation of properly itemized list of damaged materials or equipment.

F. All systems shall be operationally checked a minimum of once per week.

3.06 GENERAL MAINTENANCE

A. The recommendations of the approved Agronomic Soil Report shall take precedence over this Specification.

B. Clean sidewalks, roadways and other areas affected by maintenance operations.

C. All operations shall be conducted so as to provide minimum interference to occupants and the public. Provide advance notification of maintenance operations and schedules.

D. Leaves, paper, weeds and other debris shall be removed from landscape areas and disposed of off site by Contractor.

E. Vegetation, either new or previously existing, shall be pruned or trimmed to prevent overhanging sidewalks at less than 7 feet in height or at roadways at less than 14 feet in height under the direction of Owner’s Authorized Representative.

1. Branches greater than 4-inch diameter shall be pruned by licensed arborist approved by Owner’s Authorized Representative.

F. All planting areas must be thoroughly watered. Once growth is established, water shall be applied with less frequency and for longer periods of time to establish deep watering essential for the establishment of deep root systems.

G. Plants shall be fertilized with Hygro-U.F. 20-10-5 fertilizer every three weeks after germination for 60 days.

I. Contractor shall provide an emergency number for contact outside normal working hours.

J. Control snails and other pests and diseases as required, upon approval of methods by Owner's Authorized Representative and Owner.

K. Remove erosion scars and re-establish erosion control materials and plant materials, as necessary.

END OF SECTION

SECTION 33 1100

SITE WATER DISTRIBUTION UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Site water distribution systems located outside the building perimeter, extending to an existing water line or meter.

B. Related Requirements:

1. Section 31 2313 - Excavation and Fill.

2. Section 31 2323 - Excavation and Fill for Utilities.

3. Section 32 1313 - Site Concrete Work.

4. Section 33 3000 - Site Sanitary Sewer Utilities.

1.02 SUBMITTALS

A. Shop Drawings: Submit site plan indicating locations of lines, valves, and related appurtenances.

B. Product Data: Manufacturer's catalog data for materials. Include technical data for accessories, gaskets, joints and couplings.

C. Certificates: Certificates attesting that tests set forth in referenced publications have been performed, and the performance requirements have been satisfied.

1.03 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. American National Standards Institute (ANSI):

a. ANSI H23.1 - Seamless Copper Water Tube.

2. NSF International (NSF):

a. ANSI/NSF 61 Drinking Water System Components – Health Effects.

b. ANSI/NSF 372 Drinking Water System Components – Lead Content.

3. American Society of Mechanical Engineers (ASME):

a. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

b. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

c. ASME B16.26 - Cast Copper Alloy Fitting for Flared Copper Tubes.

d. ASME B16.51 - Copper and Copper Alloy Press-Connect Pressure Fittings.

4. American Society for Testing and Material (ASTM) International:

a. ASTM A36 – Standard Specification for Carbon Structural Steel.

b. ASTM A240 – Standard Specification for chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

c. ASTM A312 – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.

d. ASTM A536 - Standard Specification for Ductile Iron Castings.

e. ASTM B61 - Standard Specification for Steam or Valve Bronze Castings.

f. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.

g. ASTM B75 - Standard Specification for Seamless Copper Tube.

h. ASTM B88 - Standard Specification for Seamless Copper Water Tube.

i. ASTM B152 – Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar.

j. ASTM 17 – Standard Specifications for Copper Alloy Sand Castings for General Applications.

k. ASTM D1784 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

l. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.

m. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.

n. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

o. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

p. ASTM D3350 - Standard Specification for Polyethylene Plastics and Fittings Materials.

q. ASTM F2620 - Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

r. ASTM F2206 - Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE).

s. ASTM F477 - Standard Specification for Elastomeric Seals for Joining Plastic Pipe.

t. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.

5. American Water Works Association (AWWA):

a. AWWA C104/A21.4 - Cement-Mortar Lining For Ductile-Iron Pipe and Fittings.

b. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings

c. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

d. AWWA C115/A21.15 - Standard for Flanged Ductile-Iron Pipe with Threaded Flanges.

e. AWWA C153/A21.53 – American National Standard for Ductile-Iron Compact Fittings for Water Service

f. AWWA C207 – Steel Pipe Flanges for Waterworks Service Sizes 4 In. Through 144 In.

g. AWWA C500 - Metal Seated Gate Valves for Water Supply Service.

h. AWWA C503 - Wet- Barrel Fire Hydrants.

i. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 inches through 24 inches (50-mm through 600-mm) NPS.

j. AWWA C510-89 - Standard for Double Check Valve Backflow-Prevention Assembly.

k. AWWA C511 - Reduced-Pressure Principal Backflow-Prevention Assembly.

l. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

m. AWWA C800 - Underground Service Line valves and Fittings.

n. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 4 In. Through 12 In., for Water Transmission and Distribution.

o. AWWA C901 – Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. Through 3 In., for Water Service.

p. AWWA M23 - PVC Pipe - Design and Installation.

q. AWWA M55 - PE Pipe - Design and Installation.

6. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry:

a. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.

7. Uni-Bell PVC Pipe Association (UBPPA):

a. UBPPA UNI-PUB-09 - Installation Guide for Gasketed-Joint PVC Pressure Pipe (C900).

8. Underwriters Laboratories Inc. (UL):

a. UL 246 – Standard for Hydrants for Fire-Protection Service.

b. UL 262 – Standard for Gate Valves for Fire-Protection Service.

c. UL 312 – Standard for Check Valves for Fire-Protection Service.

9. National Pollutant Discharge Eliminations System (NPDES):

a. Comply with storm water requirements of general permit for storm water discharges when flushing pipe systems including storm drains and maintaining logs.

10. Plastic Pipe Institute (PPI):

a. TN-38 – Bolt Torque for Polyethylene Flanged Joints.

b. TR-4 – Technical Report requirements of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipes.

c. TR-33 – Technical Report for Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe.

B. Provide valves from the same manufacturer.

C. Manufacturer of plumbing products must be third-party certified to ANSI/NSF Standard 61, Section 9 certification, and ANSI/NSF 372 to demonstrate compliance with the federal requirements for lead contribution to drinking water, the Safe Drinking Water Act SDWA, and the California Health and Safety Code Section 116875. No pipe, pipe fitting, or any other fitting or fixture intended to convey or dispose water for human consumption for drinking or cooking is allowed in the domestic plumbing system, if they do not meet the low lead definition of Health and Safety Code 116875. Weighted average lead content of the wetted surface area of pipes, fittings and fixtures may not exceed 0.25 percent.

D. Qualifications of Manufacturer: Products used in the Work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production as reviewed by the ARCHITECT.

1.04 PRODUCT HANDLING

A. Store items above ground on platforms, skids, or other required supports.

B. Protect materials from direct sunlight.

C. Protect coating and linings on piping, fittings, and accessories from damage. Repair and/or replace damaged coatings or linings.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipes, Fittings, and Joints:

P-1: Underground water service pipe sizes up to 3-inch shall be Copper water tubing, Type K hard, ANSI H23.1, ASTM B88, IAPMO IS. Manufacturer: Mueller, Cerro Brass, Cambridge-Lee, Halstead, or equal.

An approved protective wrap shall be used to completely isolate and protect underground copper tubing and extend past the surface a minimum 12-inch. The excess wrapping shall be trimmed down and taped to copper tubing with 10 mill PVC pipe tape at grade level of concrete or asphalt.

PF-1a: Copper Press-Connect pressure fittings, comply with ASME B16.51 with Ethylene Propylene Diene Monomer, EPDM O-Ring Seal in each end. Fittings with the sizes of 2-1/2” and larger shall have cross-section Grab Rings and separation rings.

Manufacturer: Viega, Mueller Industries, Apollo, or equal.

PF-1b: Wrought Copper - solder type ASME B 16.22.

Manufacturer: Mueller Brass, Nibco, Lee Brass, or equal.

PF-1c: Grooved end type– ASTM B75 or ASTM B152 and ASME B16.22 Wrought Copper, bronze sand casting per ASTM B584 copper alloy CDA 836 per ASME B16.18. Couplings shall be CTS style 606 supplied with angle pattern bolt pads for rigidity, coated with copper coated alkyd enamel. Gaskets shall be pre-lubricated Flush seal type.

Manufacturer: Victaulic, or equal.

P-2: Underground water service pipe sizes up to 3-inch shall be high density polyethylene pipe (HDPE) with tracer wire. Pipe and fitting system shall be pressure class 333 (DR7). All material shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material shall meet the specifications of ASTM D3350 with a minimum cell classification of 445474C. HDPE pipe and fittings shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. HDPE products shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

Pipe sizes smaller than 3” shall be manufactured to the dimensional requirements listed in ASTM D3035, and 3” Pipes shall have a manufacturing standard of ASTM F714. Pipes and fittings shall meet AWWA C901 and shall be listed as meeting NSF-61.
Installer shall be certified by manufacturer for HDPE pipe and joint installation.
Manufacturer: ISCO, JM Eagle or equal.

PF-2a: Butt Fusion HDPE Fittings shall meet the following requirement:

a. Molded fittings shall comply with the requirements of ASTM D 3261.

b. All fabricated elbows, tees, reducing tees and end caps shall be produced and meet the requirements of ASTM F2206.

c. Socket fittings shall meet ASTM D 2683.

d. Installer shall be certified by manufacturer for this type of joint installation.

Manufacturer: ISCO, JM Eagle or equal.

PF-2b: Bolted Connections- Flanges and MJ Adapters shall be fused onto the pipe and have a minimum pressure rating equal to or greater than the pipe and shall meet the following requirement:

a. Metallic back-up rings (Van-Stone style lap joint flanges), shall have a radius on the inside diameter of the bore so as to be compatible with HDPE Flanges. Back up rings shall have bolt pattern that will mate with AWWA C207 Class D (generically known as 150 pound patterns).

b. Flange assemblies shall be assembled and torqued according to PPI TN-38.

c. Installer shall be certified by manufacturer for this type of joint installation.

P-3: Underground water service pipe sizes 4-inch and larger shall be C900 water service pipe material complying with AWWA C900, and ASTM D1784 Cell Class 12454B with tracer wire, NSF and UL listed. Piping shall be plain end or gasket bell end, pressure class 305 (DR14) with cast iron pipe equivalent outside diameter.

PF-3: Fire Water Service, Domestic Water and Irrigation Service Line Fittings, Joints and Jointing Materials shall be Ductile-iron with mechanical joints conforming to AWWA C110/A21.10 or AWWA C153/A21.53, C900 compatible, and shall have cement mortar lining conforming to AWWA C104/A21.4, standard thickness unless otherwise indicated on Drawings.

a. Pipe joints shall be push on as specified in ASTM D3139.

b. Joints between pipe and metal fittings, valves, and other accessories shall be mechanical joints as specified in AWWA C111/A21.11.

c. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling installation.

d. Gaskets for push on joints for pipe shall conform to ASTM F477.

e. Gaskets for push on joints and compression type joints or mechanical joints for connections between pipes and metal fittings, valves, and other accessories shall be as specified in AWWA C111/A21.11.

f. Sleeve-type mechanically coupled joints may be provided instead of push-on joints on plain-end PVC plastic joints. Comply with requirements of ASTM D3139.

g. Comply with installation guide UBPPA UNI-PUB-09.

Manufacturer: JM Eagle, Diamond Plastics, North American Pipe, or equal.

P-4: Aboveground water service pipe shall be Type 316L Stainless Steel, Schedule 40 water pipe, marked with manufacturer's identification and fittings. Manufacturer's representative shall instruct installers and certify them for joint installation. Piping system shall be provided with a five-year manufacturer’s material warranty.

Manufacturer: Viega, or equal.

PF-4: Type 316L Stainless Steel, Schedule 40 Press Fittings. For water service piping systems, provide with EPDM seals. Manufacturer's representative shall instruct installers and certify them for joint installation.

Manufacturer: Viega, or equal.

D. Gates Valves for PVC:

1. Non-rising stem type with resilient wedge gates or iron body bronze wedge gates and mechanical joint ends conform to AWWA C500.

2. Non-rising stem type with mechanical joints ends shall conform to AWWA C509.

3. Valves designed for a working pressure of 175 PSI shall be inside-screw type with operating nut, and resilient wedge type gate. Valve shall be provided with mechanical joints as required for the pipe to which it is intended to connect.

4. Valves with UL listing of 262 shall conform to AWWA C500. Valves shall open by counter-clockwise rotation of valve stem.

5. Stuffing boxes shall be provided with O-ring stem seals and shall be bolted and constructed to permit easy removal of parts for repair.

6. Sleeve type mechanical couplings may be provided instead of mechanical and push on joint ends.

7. Valve ends and gaskets for connection to sleeve type mechanical couplings shall conform to specified requirements for the joint or coupling.

E. Gate Valves in Valve Pits:

1. Outside screw and yoke rising stem type valves with resilient wedge gates and flanged ends shall conform to AWWA C500.

2. Outside screw and yoke rising stem type valves with flanged ends shall conform to AWWA C509.

3. Outside screw and yoke type Valves with double disc gates or split-wedge type gate and flanged ended ends shall be designed for 175 psi and conform to UL 262.

4. Provide valves with hand wheels that open by counterclockwise rotation of the valve stem.

5. Stuffing boxes shall be provided with O-ring stem seals and shall be bolted and constructed to permit easy removal of parts for repair.

F. Check Valves for PVC:

1. Valves shall be swing-check type conforming to AWWA C508 or UL 312.

2. Valves shall be provided with cast iron or steel body and cover, flanged ends and clear port opening.

3. Valves shall be designed for a working pressure of 175 PSI.

G. Fire Hydrants:

1. Before procurement, verify approval issued by the County of Los Angeles or Fire Department having jurisdiction.

2. Hydrants shall be wet barrel types conforming to AWWA C503 or UL 246.

3. Only 1¾-inch pentagonal nuts are to be provided on stems and protective caps.

4. Specified hydrants:

a. Clow/Rich # 850 or 860

b. James Jones #J3700 Fluted Spool

c. Equal.

H. Valve Boxes: 14 ¾-inch by 20-inch by 12-inch cast concrete with cast iron, traffic grade cover marked “WATER” (for use over water valves).

1. Brooks 36-H MB with No. 36-T cast iron cover EISEL 363.5, or equal.

I. Mechanical Thrust Restraint:

1. Restraint shall be incorporated into the follower gland.

2. Restraint shall consist of individually actuated wedges that increase resistance to pull out as internal pressure or external forces increase.

3. Gland shall be ductile iron conforming to ASTM A536.

4. Provide twist off nuts and tee-head bolts of the same size to ensure proper actuating of restraint devices.

5. Restraining device shall be provided with pressure rating equal to that of the pipe on which it is installed.

6. Restraining gland shall be UL listed.

7. Mechanical thrust restraint devices shall be EBAA Iron “Megalug” or equal.

J. Restraint Device Adapters:

1. Restrained flange adapters shall be provided instead of threaded or welded flange spool pieces on plain end of ductile iron or PVC pipe.

2. Flange adapters shall be manufactured of ductile iron conforming to ASTM A536 and be provided with flange bolt circles compatible with AWWA C115/A21.15.

3. Restraint of flange adapter shall consist of a multiple number of individually actuated gripping wedges to maximize restraint capability.

4. Torque limiting actuating screws shall be provided to insure proper initial set of gripping wedges.

5. Flange adapter shall be capable of deflection during assembly or permit lengths of pipe to be field cut to allow at least 0.6 inch of gap between end of pipe and mating flange without affecting integrity of seal.

6. Flange adapter shall be provided with a safety factor of at least 2:1 for rated pressure.

7. Restraint device adapters shall be EBAA Iron “Megaflange”, or equal.

K. Tracer Wire for Nonmetallic Pipes: Tracer wires shall be continuous solid copper wire type THWN, 12 AWG gauge, with heat and moisture resistance insulation. Blue plastic covered for domestic water and red for fire sprinkler. (Aluminum wire is prohibited). Provide in sufficient length to be continuous over each installed section of nonmetallic pipe.

L. Pipe markers shall be a concrete plaque inscribed with the word “WATER.”

M. Water Service Line Materials:

1. Water Service Line Piping Material: Refer to article 2.01.A within this section.

2. Water Service Line Appurtenances:

a. Corporation stops shall be ground key type; manufactured of bronze conforming to ASTM B61 or ASTM B62; and suitable for the working

pressure of the system. Ends shall be suitable for solder-joint or flared tube compression type joint connection. Threaded ends for inlet and outlet of corporation stops shall conform to AWWA C800; coupling nut for connection to flared copper tubing and shall conform to ASME B16.26.

b. Goosenecks shall be type K copper tubing. Joint ends for goosenecks shall be as required for connecting to corporation stop and service line. Where multiple gooseneck connections are required for individual service, connect goosenecks to service line through brass or bronze branch connection; the total clear area of branches shall be at least equal to clear area of service line. Length of goosenecks shall be as indicated or required.

c. Curb or service stops shall be ground key, round way, inverted key type; bronze, conforming to ASTM B61 or ASTM B62; and rated at 150 psi. Ends shall be as required for connection to service piping. Arrow shall be cast into body of curb or service stop indicating direction of flow.

d. Gate valves 2.5-inch and larger shall be MSS SP-80, Class 150, solid wedge, or resilient wedge gate, and non-rising stem. Valves shall be provided with flanged end connections. Provide hand wheel operators if easily accessible. Provide operating nut if inside a vault, pit or valve box.

e. Gate valves in valve pits 2-inch, and smaller shall be MSS SP-80, Class 150, bronze, solid wedge, inside screw, rising stem. Valves shall be provided with flanged end connections or threaded end connections with union on one side of valve and hand wheel operator.

f. Valve boxes shall be provided at each gate valve installed underground. Valve boxes shall be a size suitable for valve on which it is installed.

N. Water meter will be installed by water purveyor for the area, unless noted otherwise.

O. Strainers:

STR-1 Description: Wye type with Monel or Stainless Steel strainer cylinder (manufacturer's standard mesh), and gasketed machine strainer cap. Where indicated on Drawings, provide with valved (globe valve) blow out piping, same size as blow out plug:

2-inch and smaller: C.M. Bailey #100-A, bronze, 250 pound, or ductile iron with fusion bonded epoxy coating.

2 ½-inch and larger: Watts 77F-DI-FDA-125 pound, or other ductile iron fusion bonded epoxy coated flanged strainer, conforming to ASTM A312 for the strainer body, and ASTM A240 for the stainless steel strainer element. (No iron body strainer shall be used on potable water that is not fusion bonded epoxy coated inside and out.)

C.M.Bailey, Armstrong, Wilkins, Watts, or equal.

STR-2 “Y” pattern, cast iron bodies, 125 psi, Monel screen 16 square. mesh. Open area at least twice the cross-sectional area of IPS pipe in which strainer is installed and may be woven wire or perforated type. Screwed ends for sizes up to 2-inch, flanged ends for 2 ½-inch and larger perforations, in accordance with the following:

Bailey #100, Armstrong, Rp & C , Keckley, or equal.

STR-3 Bucket type, flange, semi-steel body, 125 psi, stainless steel screen with 1/8 inch diameter perforations (mounted above grade for water service). All sizes, for lines serving fire sprinkler risers:

Bailey #1, Zurn 150 Series, Rp 7 C, Watts 97fb-Fsfe, or equal.

STR-42” and larger: Watts 077-F-SS Stainless steel flange type strainer, or equal conforming to ASTM A312 for strainer body, ASTM A240 for the SS strainer element and ASTM A36 for base flange material.

P. Backflow Preventer Assemblies:

1. Assembly shall be provided with flanged connections, ductile iron with fusion bonded epoxy coated construction, bronze, or stainless steel.

2. Backflow preventer shall be suitable for cold water working pressure of 175 psi.

3. Internal parts shall be designed for replacement without removing valves from line.

4. Double check backflow preventer assembly shall consist of two independently acting spring cam or poppet style check valves, 2 shut-off valves and 4 test cocks. Check valve shall be designed to provide drip tight closure against reverse flow, low pressure drop at maximum flow capacity. Spring-loaded checks shall cause valve to seal against a higher inlet pressure than outlet pressure when there is no flow.

5. Double check backflow preventer assembly shall meet AWWA Standard C510-89. Assembly shall be Ames 2000ss, Febco 850, Watts 709, Wilkins 350, or equal.

6. Reduced pressure backflow preventer assembly shall consist of two check valves located between two shut-off valves with an area of reduced pressure between two check valves and a relief device arranged to discharge to atmosphere.

   a. Comply with AWWA Standard C511.

   b. Fluctuation in piping pressure shall not cause cycling. Backflow preventer shall automatically maintain low pressure zone to positively prevent backflow of water into system. Assembly shall automatically indicated failure of any part vital to backflow prevention by the continuous discharge relief device.

c. Reduced pressure backflow preventer assembly shall be Cla-Val Model RP-4, or equal.

7. Backflow prevention assemblies (devices), shall be tested and certified by a certified backflow tester, and a test report shall be provided to the water agency having jurisdiction. Testing shall be performed in the presence of the Project Inspector.

PART 3 - EXECUTION

3.01 EXCAVATION, BACKFILLING AND COMPACTING

A. Conform to requirements in Section 31 2323 - Excavation and Fill for Utilities or Section 31 2313 - Excavation and Fill.

3.02 PIPE INSTALLATION

A. Project site water lines shall terminate approximately 5 feet from buildings, unless otherwise indicated on Drawings. Temporarily cap or plug terminals for future connection to building.

3.03 CLEARANCES OF WATER LINE

A. Building or Structures: Two feet.

B. Parallel to Sewer Line:

1. Water line 4-inch or less in diameter shall not be installed in a common trench with the building sanitary drain unless the bottom of the water line is at least 12 inches above the top of the building sanitary drain or where the water line is installed on a solid shelf excavated on one side of the common trench with a minimum clear horizontal distance of 12 inches from the building sanitary drain.

2. Water lines 6-inch and larger in diameter shall be separated from the Project site sanitary sewer, receiving more than one building sanitary drain or acid pipeline, in accordance with the requirement of the State of California, Human and Welfare Agency, Department of Health Services.

C. Crossing Sewer Line:

1. A water line shall be separated from sanitary sewer in accordance with the requirements of the State of California Administrative Code, Title 22, Section 64630(e)(2).

2. Install water line a minimum of 12 inches clear, above or below a sanitary sewer.

3. A water line 6-inch or greater in diameter, crossing under a Project site sanitary sewer line, shall be installed with joints located at least 10 feet away from each side of the sanitary sewer line.

4. A water line 6-inch or greater in diameter, crossing over a Project site sanitary sewer line, shall be installed with joints located at least 4 feet away from each side of a purple pipe or sanitary sewer line.

D. Install water lines no closer than 10 feet horizontally clear from the edge of sewage leach fields, seepage pits, and septic tanks.

3.04 PIPE INSTALLATION AND JOINING

A. Install all piping and fitting systems according to the manufacturer requirement.

B. Remove fins and burrs from pipe and fittings.

C. Clean piping, fitting, valves, and accessories before installing. Maintain items in a clean condition.

D. Provide proper facilities for lowering sections of pipe into trenches. Do not drop into piping, fittings, or other materials into trenches. Accurately cut pipe and install without springing or forcing. Replace any piping or fitting that does not provide sufficient space for proper installation of joining material.

E. Blocking or wedging between bells and spigots is not permitted. Install bell and spigot pipe with bell end pointing in the direction of flow.

F. Install piping to the lines and grades indicated or required. Low points and dips are not permitted. Support piping at proper elevation and grade with secure and uniform supports. Wood support blocking is not permitted. Where sand cement slurry will not be furnished for backfill, install piping so that full length of each section of pipe and each fitting will solidly rest on pipe bedding. Excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where indicated or required for installation. Provide proper allowances and devices for expansion and contraction of piping and systems.

G. Maintain trenches free of standing water until pipe joints have been installed.

H. At the end of each day close open ends of pipe with temporary caps of the same material as the pipe.

I. Do not install piping when trench or weather conditions prevent proper installation.

3.05 INSTALLATION OF TRACER WIRE AND PIPE MARKERS

A. Tracer Wire: Install continuous length of tracer wire for full length of each run of nonmetallic pipe. Fasten wire to top of pipe in such a manner that it will not be displaced during construction operations. Wire shall be fastened to pipe at not greater than 20-foot intervals. Wire shall terminate above finished grade with a 12-inch lead taped around each riser. Provide a tracer wire to grade under a permanent marker where straight-line transitions of metallic to non-metallic pipe are installed.

B. Underground Pipe Markers: Provide markers at grade where non-metallic pipe is installed and for each horizontal change in direction.

3.06 CONNECTIONS TO EXISTING WATER LINES

A. After Project Inspector has inspected installation, perform connections to servicing water lines. Schedule service shutdown for connecting new system at a time causing minimum disruption.

3.07 INSTALLATION OF HDPE WATER SERVICE LINE

A. All HDPE pipe and fittings shall be cut, joined, and installed in accordance with the manufacturer's recommendations. Joining, and laying of polyethylene pipe shall be accomplished by personnel experienced and certified in working with polyethylene pipe systems.

B. Jointing:

1. All HDPE pipe shall be joined to itself by the heat fusion process which produces homogeneous, seal, leak tight joints. Tie-ins between sections of HDPE pipe shall be made by butt fusion whenever possible.

2. The pipe shall be joined by the butt fusion procedure outlined in ASTM F 2620 or PPI TR-33. A record or certificate of training for the fusion operator must be provided that documents training to the fundamentals of ASTM F 2620.

3. The employer of the fusion machine operator is responsible for the fusion joint quality of the fusion weld made by that individual. The employer is responsible for documenting all training and qualification records for that individual, including compliance to any code requirements for fusion/bonder operators.

4. All HDPE fusion equipment operators shall be qualified to the procedure used to perform pipe joining. Fusion equipment operators shall have current, formal training on all fusion equipment employed on the project approved by manufacturer. Training received more than two years prior to operation with no evidence of activity within the past 6 months shall not be considered current.

C. Installation:

1. Buried HDPE pipe and fittings shall be installed in accordance with AWWA Manual of Water Supply Practices M55 Chapter 8. The Design Window identified in AWWA M55 Chapter 5 shall be considered acceptable design and installation conditions.

2. Unless required by design documents, no thrust blocks shall be placed in the HDPE pipe system since the fused system is fully restrained.

3. All appurtenances (tees, elbows, services, valves, etc.), must be independently supported and shall not rely on the pipeline and its connections for this support. Excessive stresses may be encountered when appurtenances are inadequately supported.

3.08 INSTALLATION OF C900 PLASTIC WATER SERVICE LINE

A. Unless otherwise indicated, install pipe and fittings as specified and in accordance with UBPPA UNI-B-09 and AWWA M23, Chapter 7, “Installation”.

B. Jointing:

1. Provide push on joints with elastomeric gaskets specified for this type of joint, furnishing either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push on joint connections, provide pipe with push on joint ends furnished with factory installed bevel; for push on joint connections to metal fittings, valves and other accessories, square cut spigot end off pipe end.

2. Provide push on joint lubricant recommended by manufacturer.

3. Install push on joints for pipe-to-pipe connections in accordance with UBPPA UNI-PUB-09 and AWWA M23, Chapter 7, "Installation."

4. Install push on joints for connection to fittings, valves, and other accessories in accordance with requirements of UBPPA UNI-PUB-09 and with applicable requirements of AWWA C600.

5. Compression-type joints/mechanical-joints with gaskets, glands, bolts, nuts and internal stiffeners shall be installed in accordance with the requirements of UBPPA UNI-PUB-09 and AWWA C600 and Appendix A to AWWA C 111/A21.11.

    a. Square cut spigot off end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel.

6. Sleeve-type mechanical couplings shall be provided in strict accordance with coupling manufacturer's recommendations using internal stiffeners as specified for compression-type joints.

C. Provide mechanical thrust restraint devices for anchorage and piping unless thrust blocks are indicated on the Drawings. Thrust blocks shall be installed in accordance with the requirements of UBPPA UNI-PUB-09 except that size and location of blocks shall be as indicated. Thrust blocks shall be provided as specified in Section 32 1313 - Site Concrete Work.

3.09 INSTALLATION OF VALVES

A. Provide gate valves conforming to AWWA C500 and UL 262 in accordance with AWWA C600 for valve and fitting installation and with recommendations of AWWA C500 Appendix "Installation, Operation, and Maintenance of Gate Valves".

B. Provide gate valves conforming to AWWA C600 in accordance with AWWA C509 for valve and fitting installation and with recommendations of AWWA C500 Appendix "Installation, Operation, and Maintenance of Gate Valves".

C. Provide gate valves on PVC water service lines in accordance with AWWA M23 Chapter 7, "Installation."

D. Provide check valves and fittings in accordance with applicable requirements of AWWA C600 unless noted otherwise on the Drawings.

E. Provide gate and check valve joints as specified for the type of joints between pipe and fittings.

3.10 INSTALLATION OF HYDRANTS

A. Install hydrants according to requirements of AWWA C600 for hydrant installation and as indicated. Provide joints as specified for the type of joints between pipe and fittings.

B. Install hydrant with a 6-inch key gate valve between 4 and 10 feet from the hydrant.

3.11 INSTALLATION OF BACKFLOW PREVENTERS

A. Install reduced pressure backflow preventers to comply with RULE 16D of LADWP in the jurisdictional boundaries of Los Angeles Department of Water and Power.

3.12 INSTALLATION OF STRAINERS:

A. Strainers shall be installed on each water line downstream of the meter, above grade at the pressure regulating station. When a pressure regulating station (assembly) is not provided, “wye” type flange strainer shall be provided, with a shut off valve on the inlet and the outlet side.

B. If the water line is serving fire sprinkler risers or hydrants, then an approved fire service strainer shall be used: Watts 97DB-FSFE, or equal.

3.13 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. For complete requirement and procedure refer to section 22 1000, article 3.12.

3.14 ELECTROLYSIS PREVENTION

A. A minimum 6-inch long brass nipple shall be installed at locations specified or as required. Flanges shall be provided with a complete insulating component consisting of; gasket bolt sleeves and bolt washers. Dielectric insulators shall be installed at locations indicated or as required. Dielectric fittings are prohibited.

B. Where steel or cast iron below grade connects to copper or brass piping above grade, the transition from steel or cast iron pipe to copper or brass pipe shall be installed in an above grade accessible location.

C. Underground connections between dissimilar metals shall be in accessible yard boxes.

D. Above ground dielectric connections shall be exposed.

3.15 ABANDONING WATER LINES AND STRUCTURES

A. Water lines and appurtenances to be abandoned in place shall be cut and removed from areas where new Work is being installed.

B. Cap or plug abandoned existing drain lines below grade in a yard box and according to CBC.

3.16 TESTS AND INSPECTIONS

A. Provide labor, equipment, materials, test equipment and incidentals required for performing required field tests.

B. Tests shall not be performed for five days after concrete thrust blocks have been installed.

C. Testing Procedure: Water service lines shall be tested in accordance with applicable specified standard.

1. Test water service lines in accordance with applicable requirements of AWWA C600. No leakage is permitted.

2. Pressure testing: Before pressure test, fill portion of piping being tested with water for a minimum of 24 hours. Provide hydrostatic pressure of at least 50 psi greater than the maximum working pressure of tested system, but no less than 200 psi hydrostatic test pressure for system piping of 2-inch in diameter and larger. Provide and maintain hydrostatic test pressure for at least two hours to ensure no leakage of any portion of piping or appurtenances under pressure test.

3.17 CLEANING

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.18 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 33 3000

SITE SANITARY SEWER UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Building Sanitary Sewer Lateral.

2. Closed-circuit television inspection of sewer laterals.

B. Related Requirements:

1. Section 31 2313 - Excavation and Fill.

2. Section 31 2323 - Excavation and Fill for Utilities.

3. Section 32 1313 - Site Concrete Work.

1.02 SUBMITTALS

A. Shop Drawings: Submit site plan denoting locations of lines, valves, and appurtenances.

B. Product Data: Manufacturer's catalog data for materials. Include technical data for accessories, gaskets, joints and couplings.

C. Certificates: Certificates attesting that tests set forth in referenced publication have been performed and the results required by design have been met.

D. Closeout Submittal: Submit three DVD's of Closed-circuit television inspections performed. Include the following information:

1. Electronic Media Recordings: Visual and audio record of the entire length of pipe. For existing laterals identify problem areas, such as roots, cracks, fractures, broken pipe, and other unusual conditions found.

2. Digital Photographs of the pipe condition, connections, points of interest and defects found. Indicate distance of defects to a point of reference such as face of building or mainline.

3. Inspection Log: Provide written report including:

a. Date and time of inspection.

b. Name of School, Project, CONTRACTOR, and operator name.

c. Location, material and size of pipe.

d. Description of defects found.

1.03 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. Standard Specifications for Public Works construction, current edition.

2. California Plumbing Code, CPC, current edition.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Pipeline: Building or Project Site Sanitary Sewer and Vent: Minimum 5 feet away from building boundaries. For piping within 5 feet from building boundaries, and interior piping refer to Division 22 plumbing sections.

1. Cast iron soil pipe: Hubless, service weight, ASTM A888, CISPI 301, conforming to CISPI 310 and installed in accordance to IAPMO IS 6. Manufacturer: American Foundry, Tyler, or AB&I, or equal.

a. Cast iron soil coupling: Hubless, heavy-duty with neoprene gaskets, stainless steel corrugated shields, and 4 bands of stainless-steel clamps. IAPMO, ASTM C564 and CISPI 310. Manufacturer: American Foundry, Mission Rubber Company, Tyler, or equal.

2. PVC (Poly Vinyl Chloride) Schedule 40 DWV Pipe, Conforming to ASTM D2665, ASTM F794, and ASTM F1866. Installer of PVC Schedule 40 DWV piping system shall carry ASTM D2855 and ASME B31.3 qualification. Installer shall provide proof of these qualifications to IOR prior to commencing work. Manufacturer: Charlotte pipe and foundry, Spears Manufacturing Company, Harvel Plastics Inc., or equal.

a. PVC primer and solvent for chemical weld of pipe and fittings shall be as recommended by pipe manufacturer. Containers for solvent and primer shall be clearly marked with manufacturer's data. Solvent and primer shall not be more than one year old. The safety placards must be visible. Blue or red hot glue shall not be used.

1) Primer: Weld-On P-70 by IPS, Conforming to ASTM F656.

2) Cement: Weld-On 711 (gray) by IPS, Conforming to ASTM D2564.

3. Vitrified clay extra strength piping with plain ends. Comply with ASTM C700. Install with mechanical compression couplings. Joints shall comply with ASTM C425. Installation shall be in accordance with ASTM C12.

Manufacturer: Mission Clay Products, or equal.

4. Acid waste and vent pipeline from building to Sampling Box: Refer to Division 22 for corrosive waste and vent piping.

B. Cleanout Assemblies: Cleanout plug shall be line size.

1. In covered concrete-paved floors: Iron body with UPC recognized plug, top, and adjustable sleeve, cut-off ferrule, polished brass/nickel/bronze, and secured Scoriated cover:

a. Square:

J.R.SMITH	ZURN	JOSAM	OR EQUAL
4053	Z1400-SZ	57008-Z-1-SQ	

b. Round:

J.R.SMITH	ZURN	WADE	JOSAM	OR EQUAL
4033	Z1400-BZ	W-6000	57008-Z-1	

2. Outside covered concrete-paved floors: Secured cover, extra heavy-duty, adjustable sleeve, cut-off ferrule, UPC recognized brass type plug, scoriated tractor type cover:

J.R.SMITH	ZURN	OR EQUAL
4233	Z1402-HD	

3. In yard boxes: Raised threaded head brass plug and Cast Iron Body Cleanout.

J.R.SMITH	ZURN	WADE	JOSAM	OR EQUAL
		8590A		

C. Yard Boxes: 14 1/2-inch by 19 3/4-inch by 12-inch, cast concrete, with cast-iron hinged locking traffic cover with the word “SEWER,” embossed on the cover in one inch high upper case lettering.

BROOKS No. 36-HFL Assembly with cast iron hinged locking cover	OR EQUAL

D. Concrete, Mortar and Related Materials: Conform to Section 32 1313 - Site Concrete Work, unless noted otherwise.

E. Metal Covers, Frames and Accessories:

1. Conform to Section 206 – Miscellaneous Metal Items of the Standard Specifications for Public Works Construction.

2. Metal Covers and Frames: Vandal-resistant design and construction.

3. Hot-dip galvanize steel parts after fabrication and prior to assembly in accordance with Section 210 – Paint and Protective Coating of the Standard Specifications for Public Works Construction.

F. Bedding Materials: Conform to the requirements of Section 31 2313 - Excavation and Fill or Section 31 2323 - Excavation and Fill for Utilities, as required.

PART 3 – EXECUTION

3.01 SANITARY SEWER INSTALLATION

A. Install sanitary sewers in a uniform alignment and slope to the point of connection as indicated. Before trench excavation, verify size, material, depth, and location of the point of connection. Minimum depth of below grade sewer lines shall be 24 inches to centerline of pipe

B. Pipe slope shall not be less than ¼ inch per foot or 2 percent unless pipe inverts are indicated. Where invert elevations are indicated, install pipe at a uniform slope between inverts.

C. Join pipes and fittings as recommended by the manufacturer.

D. PVC schedule 40 DWV pipe and fittings shall be solvent welded. PVC pipe ends shall be cut ninety (90) degrees and Beveled from 10°-15° with a proper beveling tool, cleaned and cleared of cutting burrs prior to cementing. Use approved reaming tool. Pipe ends shall be wiped clean and free of dirt, moisture, oil, and other foreign material with a rag. Primer shall be applied until the surface of the pipe and fitting is softened. Cement shall be applied with a light coat on the inside of the fitting and two heavier coats on the outside of the pipe. Pipe shall be inserted into the fitting and given a quarter turn while inserting if possible to help seat the cement while both the inside socket surface and outside surface of pipe are wet with solvent cement. Hold joint in place and undisturbed for 1 minute after assembly. Excess cement shall be wiped from the outside of the pipe.

3.02 CLEARANCE OF SANITARY SEWERS

A. Buildings or Structures: Two feet.

B. Parallel to Water Line:

1. Building sanitary drain, is not permitted to be installed in a common trench with a potable water line unless the bottom of the water line is at least 12 inches above the top of the sanitary sewer.

2. In addition, the potable water line shall be installed on a solid shelf excavated on one side of the common trench with a minimum clear horizontal distance of 12 inches from the sanitary sewer or building sanitary drain.

3. Project site sanitary sewer, receiving more than one building sanitary drain or acid pipeline, shall be separated from a potable water line in accordance with the requirements of the California Health, and Human Services Agency: Department of Public Health.

C. Crossing Water Line:

1. Building sanitary drain shall be installed a minimum of 12 inches below the potable water line.

2. Project site sanitary sewer shall be separated from the potable water main in accordance with the requirements of the State of California Administrative Code, Title 22, Section 64630(e)(2).

3.03 MANHOLES

A. Provide manholes in accordance with the Standard Plans for Public Works Construction, unless otherwise indicated.

B. Adjust manholes in accordance with the sub-section 302-5.8 Manholes (and other structures) of the Standard Specifications for Public Works Construction.

3.04 CLEANOUTS

A. Provide cleanout at the upper terminal for each sanitary pipeline, at intervals not exceeding 100 feet in straight run and any fraction thereof and for each aggregate horizontal change in direction exceeding 135 degrees.

B. Install required cleanouts before back filling of horizontal pipelines.

C. In unpaved and asphalt-paved areas, install cleanouts in yard boxes 2 inches below the yard box cover.

D. In concrete-paved areas, extend cleanouts flush with finish grade.

E. In traffic areas, install countersunk cleanout plugs where raised heads protrude.

3.05 ABANDONED SEWERS AND STRUCTURES

A. Plug or cap every abandoned sanitary sewer within 5 feet of the property line in a code required manner.

B. Demolish abandoned sanitary structures such as cesspool, septic tank, sewage pit, and manholes to a minimum depth of 5 feet below the finish grade, including removal of sewage. Disconnect any piping. After inspection, completely fill with earth, sand, gravel, cement-sand slurry, or other required material.

3.06 TESTING

A. After installation, test each sanitary drain and/or sewer and each section between successive manholes for either infiltration or exfiltration. Test shall be conducted in accordance with Section 306 - Underground Conduit Construction of the Standard Specifications for Public Works Construction.

B. Where excessive ground water is encountered test the pipeline for infiltration.

C. When infiltration or exfiltration exceeds allowable amounts as set forth in the Section 306 formula, perform repairs or replacements as necessary to comply with the required limits.

3.07 CLOSED-CIRCUIT TELEVISION INSPECTION

A. Coordinate with OAR time and date of inspection. Project Inspector shall be present during the CCTV inspection.

B. Clean laterals by hydraulic jet.

C. Perform internal closed-circuit television inspection of lateral from the building to the public mainline. Record sewer in its entirety with no breaks or interruptions. Move camera at a speed no grater than 30 feet per minute, stopping for a minimum of ten seconds to record pipe connections, defects, and points of interest.

D. Maintain technical quality, sharp focus and distortion free picture. Pan, tilt, and rotate as necessary to best view and evaluate connections, defects and points of interest.

E. Closed-circuit Television Equipment: As a minimum equipment shall include:

1. Television camera specially designed for pipe inspections, and operative in 100 percent humidity conditions.

2. Camera and television monitor capable of producing minimum 470H-line resolution color video picture.

3. Camera capable to inspect laterals as small as three inches up to 70 feet from sewer mainline.

4. Camera lighting shall be suitable to allow clear picture of inner wall at least ten feet in front.

F. Defective Work:

1. New Laterals: Defective Work found shall be repaired at CONTRACTOR's expense. Perform a new closed-circuit television inspection at no cost to OWNER.

2. Existing Laterals:

a. If roots, sludge, or sediment material or other defect not related to the Work of this project impedes inspection, withdraw camera, restart inspection from opposite end and notify OAR of defects found.

b. If obstruction or stoppage was caused by Work related to this project, remove obstruction at no cost to OWNER. Perform a new closed-circuit television inspection at CONTRACTOR's expense.

3.08 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.09 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 33 4000

STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes storm drainage piping; sub-surface drains; metal covers, grates and frames; catch basins; box culverts; manholes, and BMPs.

1. Best Management Practices (BMPs):

a. Catch Basin Inserts.

b. Downspout Filters.

1.02 RELATED REQUIREMENTS

A. Section 31 2313 - Excavation and Fill.

B. Section 31 2323 - Excavation and Fill for Utilities.

C. Section 32 1313 - Site Concrete Work.

1.03 DEFINITIONS

A. AASHTO: American Association of State Highway and Transportation Officials.

B. ASME: American Society of Mechanical Engineers.

C. ASTM: American Society for Testing and Materials.

D. BMP: Stormwater Best Management Practice.

E. CBC: California Building Code.

F. CCTV: Closed-Circuit Television.

G. DET: Detention BMP.

H. DWV: Drain, Waste, and Vent.

I. FILT: Filter BMP.

J. GS: Gravity Separator.

K. HDPE: High Density Polyethylene.

L. IAPMO: International Association of Plumbing and Mechanical Officials.

M. IOR: Inspector of Record.

N. NPS: Nominal Pipe Size.

O. OAR: OWNER's Authorized Representative.

P. PE: Polyethylene.

Q. Post Construction BMP: Devices installed by the CONTRACTOR for storm water management to be left on site after construction completion.

R. PP: Polypropylene.

S. PVC: Poly Vinyl Chloride.

T. RET: Retention.

U. SDR: Standard Dimensions Ratio.

V. VEG: Vegetative.

W. OWNER: Los Angeles Unified School District.

X. SWPPP: Storm Water Pollution Prevention Plan.

1.04 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. ASHTO M 252: Geotextile Specification for Highway Applications.

2. AASHTO M 294: Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.

3. AASHTO M 330: Standard Specification for Polypropylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.

B. American Society for Testing and Materials International (ASTM):

1. ASTM A888: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

2. ASTM C14: Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.

3. ASTM C443: Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

4. ASTM C564: Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

5. ASTM C76: Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

6. ASTM C857: Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.

7. ASTM C858: Standard Specification for Underground Precast Concrete Utility Structures.

8. ASTM C891: Standard Practice for Installation of Underground Precast Concrete Utility Structures.

9. ASTM D2564: Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

10. ASTM D2665: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

11. ASTM D2855: Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.

12. ASTM D3034: Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

13. ASTM D3212: Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

14. ASTM D448: Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

15. ASTM F1866: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Schedule 40 Drainage and DWV Fabricated Fittings.

16. ASTM F2306: Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.

17. ASTM F2418: Standard Specification for Polypropylene Corrugated Wall Stormwater Collection Chambers.

18. ASTM F2764: Standard Specification for 6 to 60 in. [150 to 1500 mm] Polypropylene (PP) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications.

19. ASTM F2787: Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers.

20. ASTM F2881: Standard Specification for 12 to 60 in. [300 to 1500 mm] Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications.

21. ASTM F2922: Standard Specification for Polyethylene Corrugated Wall Stormwater Collection Chambers.

22. ASTM F477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

23. ASTM F656: Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

24. ASTM F794: Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

C. Cast Iron Soil Pipe Institute (CISPI):

1. CISPI 301: Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

2. CISPI 310: Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

D. The International Association of Plumbing and Mechanical Officials (IAPMO):

1. IAPMO IS 6: Hubless Cast Iron Sanitary and Rainwater Systems - Installation Standards.

E. Standard Specifications for Public Works Constructions (Greenbook):

1. Section 202: Masonry Materials.

2. Section 206: Miscellaneous Metal Items.

3. Section 207: Pipe.

4. Section 208: Pipe Joint Types and Materials.

5. Section 210: Paint and Protective Coatings.

6. Section 306: Underground Conduit Construction.

1.05 SUBMITTALS

A. Shop Drawings: Submit site plan denoting locations of lines, valves, and appurtenances.

B. Product Data: Manufacturer’s catalog data for all required materials. Include technical data for accessories, information concerning gaskets, joints and couplings.

C. Certificates: Certificates attesting that tests set forth in referenced publication have been performed and the results required by design have been met.

D. Closeout Documents: At Substantial Completion submit to the OAR two CD’s and one hard copy of the documents indicated in paragraphs 1 through 5 below:

1. Maintenance Log: Provide Microsoft Excel Spreadsheet including the following information:

a. Maintenance log and upkeep records of the installed Post Construction BMPs. Include the following headers as a minimum: “Date of Service”, “Location of BMP”, “Type of Maintenance or Service”, “Notes”, “Next Scheduled Preventive Maintenance Due”, and “Inspector Signature”.

b. Maintenance Requirements: Include the following headers as a minimum: “BMP Description”, “Location of BMP and Map Grid Location” and “Type of Maintenance or Service Needed”, i.e.; weekly, monthly, quarterly, etcetera. “Stock No.”, “Manufacturer Contact Information”, along with “Frequency” namely: weekly, monthly, quarterly, etcetera and “Special Instructions”.

2. Maintenance Manuals: Provide Maintenance Manual for storm drainage BMP components installed along with requirements, replacement or maintenance schedule and plans with the location of each BMP component. This manual shall include product information cut sheet, shop drawings, vendor information for each component and warranty.

3. Record drawings: ‘As-Builts’ site plan(s) showing Post Construction BMP. Provide a copy of marked record set with red pencil identifying any variations from design documents.

4. Training Documentation:

a. OWNER attendees sign off training sheet.

b. Two DVD’s of materials covered in the training and components installed.

5. Post-Construction BMP Maintenance Plan: Submit complete Plan per Attachment “A”, edit per As-Built conditions and provide missing information.

6. Records of Closed-Circuit Television Inspection: At Substantial Completion submit to the OAR three DVD’s of Closed-circuit television inspections performed. Include the following information:

a. Electronic Media Recordings: Visual and audio record of the entire length of pipe. For existing laterals identify problem areas, such as roots, cracks, fractures, broken pipe, and other unusual conditions found.

b. Digital Photographs of the pipe condition, connections, points of interest and defects found. Indicate distance of defects to a point of reference such as face of building or mainline. Provide the Digital Photographs after fixing the defective pipes.

c. Inspection Log: Provide written report including:

1) Date and time of inspection.

2) Name of School, Project, CONTRACTOR, and operator name.

3) Location, material and size of pipe.

4) Description of defects found and attempts to fix them.

1.06 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic products, pipes, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle all products according to manufacturer's written rigging instructions.

1.08 TRAINING OF OWNER PERSONNEL

A. At Substantial Completion and when the storm drainage system is fully operational, knowledgeable representatives from the CONTRACTOR and manufacturer(s) of the components specified and installed at the site shall provide up to 8 hours of training. Date, time and location for the training shall be coordinated through the project OAR. Have OWNER attendees sign off training sheet and provide a copy to the OAR.

B. Training period shall cover but not be limited to the following:

1. Explain the operation of storm drainage system and its design intent.

2. Explain the maintenance requirements of every component of the system.

3. Provide recommendations of practices to minimize or eliminate negative impact on the system.

4. Provide maintenance schedule as recommended by the manufacturers for every component and review it with OWNER’s Maintenance and Operations staff.

5. Conduct a site walk, identify every component of the system and demonstrate its operation.

6. Training shall be conducted with the use of Maintenance log and Maintenance manual.

1.09 SURPLUS MATERIALS

A. Provide enough additional materials for each component of BMP that requires replacement or service during the first year.

1.10 ATTACHMENTS

A. The following attachments are included at the end of Section 33 4000:

1. Attachment “A” - Post-Construction BMP Maintenance Plan.

PART 2 – MATERIALS AND PRODUCTS

2.01 PIPING MATERIALS

A. General: Minimum 5 feet away from building boundaries. For piping within 5 feet from building boundaries, and interior piping refer to Division 22 plumbing sections. Provide piping system in conformance with Section 207 - Pipe and Section 208 - Pipe Joint Types and Materials of the Standard Specifications for Public Works Construction. All Soil-tight pipes shall be provided with joints that are function of opening size, channel length, and backfill particle size. A backfill material containing a high percentage of fine-graded soils requires investigation for the specific type of joint to be used to guard against soil infiltration, including the requirement for fabric-wrapped joints.

B. Nonreinforced Concrete Pipe (CP): ASTM C14, with bell-and-spigot ends and gasketed joints with ASTM C443 rubber gaskets.

C. Reinforced Concrete Pipe (RCP): ASTM C76, with bell-and-spigot ends and gasketed joints with ASTM C443 rubber gaskets.

D. Cast Iron Soil Pipe (CIP):

1. Hubless, service weight, ASTM A888, CISPI 301, conforming to CISPI 310 and installed in accordance to IAPMO IS 6.

2. Cast iron soil coupling: Hubless, heavy-duty with neoprene gaskets, stainless steel corrugated shields, and 4 bands of stainless-steel clamps. IAPMO, ASTM C564 and CISPI 310.

3. Approved manufacturers: American Foundry, Mission Rubber Company, Tyler, or equal.

E. Corrugated, Dual Wall, High Density Polyethylene Drainage Pipe (HDPE):

1. Corrugated PE Drainage Pipe and Fittings NPS 4 to NPS 10: AASHTO M 252, Type S (double-wall) with smooth waterway for coupling joints.

2. Corrugated PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294 or ASTM F2306, Type S (double-wall) with smooth waterway for coupling joints.

3. Approved manufacturer: ADS, Hancor, JM Eagle, or equal.

F. Corrugated, Dual or Triple Wall, Polypropylene Pipe (PP):

1. Corrugated PP Drainage Pipe and Fittings NPS 12 to NPS 60: ASTM F2764, ASTM F2881, or AASHTO M 330, Type S (double-wall) or Type D (triple-wall), for respective diameters. Provide coupling joints with smooth waterway.

2. Approved manufacturers: ADS, Prinsco, or equal.

G. PVC (Poly Vinyl Chloride) Schedule 40 DWV Pipe:

1. Conform to ASTM D2665, ASTM F794, and ASTM F1866.

2. Installer of PVC Schedule 40 DWV piping system shall carry ASTM D2855 and ASME B31.3 qualification. Installer shall provide proof of these qualifications to IOR prior to commencing work.

3. Containers for solvent and primer shall be clearly marked with manufacturer's data. Solvent and primer shall not be more than one year old. The safety placards must be visible.

4. Blue or red-hot glue shall not be used.

5. Approved manufacturers and products:

a. Pipe: Charlotte pipe and foundry, Harvel Plastics Inc., JM Eagle, Spears Manufacturing Company, or equal.

b. Primer: Weld-On P-70 by IPS, Conforming to ASTM F656.

c. Cement: Weld-On 711 (gray) by IPS, Conforming to ASTM D2564.

H. PVC (Poly Vinyl Chloride) SDR-35 Pipe, 6" through 15":

1. Conform to ASTM D3034.

2. Gasketed Joints: Elastomeric gasket joints conforming to ASTM D3212.

3. Gaskets: Chloroprene conforming to ASTM F477.

4. Approved manufacturers: Charlotte pipe and foundry, Harvel Plastics Inc., JM Eagle, Spears Manufacturing Company, or equal.

2.02 BEDDING MATERIAL FOR PIPE

A. General: Conform to the requirements of Section 31 2313 - Excavation and Fill or Section 31 2323 - Excavation and Fill for Utilities, as required.

B. Approved manufacturers and products:

1. Propex Fabrics, Inc.: Geotex 451.

2. TenCate Geosynthetics Americas: Mirafi 140N.

3. US Fabrics, Inc.: 120NW.

4. Equal products.

2.03 PERFORATED SUBSURFACE DRAIN PIPE

A. Shop-perforated with perforations symmetrically located within a maximum arc of 160 degrees. Perforations shall provide a total open area of at least 0.3 square inches per linear foot of pipe, with a minimum of one perforation per linear foot, except for joint areas. Perforation shall be either holes or slots. Hole diameters of ¼ inch minimum to 3/8 inch maximum. Width of slots of 3/16 inch minimum to 5/16 inch maximum with slot length not exceeding 4 inches.

B. Aggregate around perforated pipe shall be 6 inches of gravel containing no particles finer than a 3/8-inch to 1/2-inch sieve opening size.

2.04 STORMWATER TREATMENT SYSTEMS /BMPS

A. DET-1: Proprietary Detention BMPs – Reinforced Precast Concrete, approved manufacturers and products:

1. Jensen Precast: Precast-Concrete-Detention-Reservoir.

2. Oldcastle Precast Inc.: Storm Capture-Detention.

3. Storm Trap: Single-Trap-Detention.

4. Equal products.

B. FILT-2: Cartridge Media Filters, approved manufacturers and products:

1. Baysaver Technologies Inc.: Bayfilter.

2. Contech: Storm Filter.

3. OldCastle Precast Inc.: Perk Filter.

4. Equal products.

C. GS-1: Hydrodynamic Separation Devices, approved manufacturers and products:

1. ADS-Baysaver Technologies Inc.: Barracuda S Series.

2. Contech: CDS.

3. Hydro International: First Defense HC (High Capacity).

4. Jensen Precast: JDS.

5. Oldcastle Precast Inc.: DVS.

6. Equal products.

D. GS-2: Catch Basin Inserts, approved manufacturers and products:

1. AbTech Industries: UUF DI-DO.

2. ADS-FlexStorm: FlexStorm Pure or Catch-it.

3. Aquashield Inc.: Aqua-Guardian.

4. Ecosense International: EcoSense International's Catch Basin Insert.

5. Oldcastle Precast Inc.: FLoGard, or GISB.

6. UltraTech International Inc.: Ultra-Drain Guard.

7. Equal products.

E. GS-3: Downspout Filters, approved manufacturers and products:

1. Oldcastle Precast Inc.: FLoGard +Plus.

2. Equal products.

F. GS-5: Stormwater Interceptors, approved manufacturers and products:

1. Jensen Precast: JPHV-stormwater-interceptors-with-bypass.

2. Oldcastle Precast Inc.: Storm Capture Detention.

3. Oldcastle Precast Inc.: NSBB, Nutrient Separating Baffle Box.

4. Storm Trap: Single-Trap-Detention.

5. Equal products.

G. RET-4: Drywells

1. Pre-Cast Liner: Reinforced 4000 PSI concrete. 48" I.D., 54" O.D.

2. Overflow/Riser Pipe: Minimum 6" I.D. Schedule 40 Poly Vinyl Chloride (PVC) solid wall with debris shield.

3. Drainage Screen: Minimum 6" I.D., Schedule 40 PVC slotted screen with 0.120-inch slots continuous, with a minimum of 160 slots per foot.

4. Rock: Clean washed rock uniformly graded between 3/8" and 1-1/2".

5. Absorbent: Hydrophobic petrochemical sponge with minimum four (4) quart capacity used in all chambers.

6. Approved manufacturers and products:

a. Torrent Resources: MaxWell.

b. Equal products.

H. RET-7a: Proprietary Retention/Infiltration BMPs – Polypropylene or Polyethylene

1. Molded PP or PE with open bottom. Thermoplastic Corrugated Wall Chambers (Chambers): Provide in conformance with ASTM F 2418 "Standard Specification for Polypropylene Corrugated Wall Stormwater Collection Chambers", ASTM F 2922 "Standard Specification for Polyethylene Corrugated Wall Stormwater Collection Chambers", and ASTM F 2787 "Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers".

2. Filtering Material: ASTM.D448, washed, crushed stone or ¾" to 2" gravel. For more information refer to plans, and manufacturer installation manual.

3. Filter Mat, applicable to isolator/main row: Geotextile woven or spun filter fabric, in one or more layers. For more information refer to plans, and manufacturer installation manual.

4. Provide non-woven geotextile fabric around the entire system to prevent migration of fines into the rock voids. For more information refer to plans, and manufacturer installation manual.

5. Pipe Systems: Perforated manifold, header, and lateral piping complying with AASHTO M 252 for NPS 10 and smaller, AASHTO M 294 for NPS 12 to NPS 60. Include proprietary fittings, couplings, seals, and filter fabric.

6. Approved manufacturers and products:

   a. ADS - Storm Tech: MC3500, MC4500, SC740 or DC780.

   b. Contech: ChamberMaxx.

   c. NDS: StormChambers SC34 or SC44.

   d. Prinsco: HydroStor HS180 or HS75.

   e. Triton: S22 or S29.

   f. Equal products.

I. RET-7b: Proprietary Retention/Infiltration BMPs – Reinforced Precast Concrete, approved manufacturers and products:

1. Jensen Precast: Precast-Concrete-Arches.

2. Oldcastle Precast Inc.: Storm Capture Infiltration.

3. StormTrap: Single-Trap-Infiltration.

4. Equal products

J. VEG-6: Proprietary Biotreatment Devices, approved manufacturers and products:

1. BioClean: Modular Wetlands System.

   a. Infiltration media shall be ARCOSA.

2. Contech: Filterra Bioretention Systems.

   a. Infiltration media shall be Filterra Media consist of a combination of natural sand, gravel, and organic materials.

3. DeepRoot Urban Landscape: Silva Cell 2.

4. Oldcastle: BioPod Underground.

   a. Infiltration media shall be StormMix.

5. Equal products.

2.05 MISCELLANEOUS MATERIALS

A. Metal Covers, Grates, Frames and Accessories:

1. Conform to Section 206 - Miscellaneous Metal Items of the Standard Specifications for Public Works Construction.

2. Hot-dip galvanize steel parts after fabrication in accordance with Section 210 - Paint and Protective Coatings of the Standard Specifications for Public Works Construction.

3. Grates and Frames:

a. Standard bolted design and construction.

b. ADA compliant, in conformance to CBC 11B-302.3.

c. Rated for vehicular traffic on areas intended for use by motor vehicles.

d. Hot-dip galvanized.

B. Concrete, Mortar and Related Materials: Conform to Section 32 1313 - Site Concrete Work.

C. Manhole Brick Mortar, Grout, and Plaster: Conform to Standard Specifications for Public Works Construction, Section 202 - Masonry Materials.

D. Underground Concrete Structures: Shall be precast and rated for H-20 traffic loading and applicable soil loads. The materials and structural design of the devices shall be per ASTM C857 and ASTM C858.

2.06 NAMEPLATES

A. Stainless steel or aluminium nameplate permanently fastened to BMP showing the following information:

1. BMP ID number and BMP type.

2. Next service day followed by a 1-inch by 4-inch long blank space.

3. Manufacturer name, model number, telephone number and stock ID number.

4. Installation or production date.

5. 1-inch by 4-inch blank space for OWNER's use.

PART 3 – EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. CONTRACTOR shall arrange for a preconstruction meeting with the manufacturer's representative to review the basic principles for proper installation of Underground BMP type products prior to any installation.

B. Underground Concrete modules shall be installed in accordance with manufacturer's instructions and the current ASTM C891 procedures.

3.02 EXCAVATION, BACKFILLING AND COMPACTING

A. Conform to the requirements of Section 31 2313 - Excavation and Fill or Section 31 2323 - Excavation and Fill for Utilities, as required.

3.03 INSTALLATION OF PIPE

A. Conform to Section 306 - Underground Conduit Construction of the Standard Specifications for Public Works Construction.

B. Non-ferrous drainpipe installed with less than 12 inches of cover to finish grade shall be provided with a 4-inch thick concrete pipe encasement.

3.04 DRAINAGE APPURTENANCES

A. Catch basins, junction chambers, manholes, box culverts, outlet chambers and other drainage structures: Construct as indicated on Drawings and as specified in Section 32 1313 - Site Concrete Work, and in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.

B. Ensure that Post Construction BMP have a visible identifying manufacturer tag with product identification, manufacturer contact information, date of last service and date of next service due.

C. Provide storm drain stencil per City or County requirements as applicable.

3.05 STORMWATER TREATMENT SYSTEMS/BMPs

A. (Shall be completed by design team.)

3.06 ABANDONED DRAINAGE LINES AND STRUCTURES

A. Cap or plug existing drain lines that are cut and abandoned and remove existing drainage structures that are abandoned.

3.07 CLOSED-CIRCUIT TELEVISION INSPECTION

A. Coordinate with OAR time and date of inspection. Project Inspector shall be present during the CCTV inspection.

B. Clean laterals by hydraulic jet.

C. Perform internal closed-circuit television inspection of lateral from the building to the public mainline. Record drain line in its entirety with no breaks or interruptions. Move

camera at a speed no greater than 30 feet per minute, stopping for a minimum of ten seconds to record pipe connections, defects, and points of interest.

D. Maintain technical quality, sharp focus and distortion free picture. Pan, tilt, and rotate as necessary to best view and evaluate connections, defects and points of interest.

E. Minimum Requirements for Closed-circuit Television Equipment:

1. Television camera specially designed for pipe inspections, and operative in 100 percent humidity conditions.

2. Camera and television monitor capable of producing minimum 470H-line resolution color video picture.

3. Camera capable to inspect lines as small as three inches up to 70 feet from storm drain mainline.

4. Camera lighting shall be suitable to allow clear picture of inner wall at least ten feet in front.

F. Defective Work:

1. New Lines: Defective Work found shall be repaired at CONTRACTOR's expense. Perform a new closed-circuit television inspection at no cost to OWNER.

2. Existing Laterals:

a. If roots, sludge, or sediment material or other defect not related to the Work of this project impedes inspection, withdraw camera, restart inspection from opposite end and notify OAR of defects found.

b. If obstruction or stoppage was caused by Work related to this project, remove obstruction at no cost to OWNER. Perform a new closed-circuit television inspection at CONTRACTOR's expense.

3.08 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

B. Maintain Post Construction BMP after installation and keep a maintenance log to be turned over to OAR at Substantial Completion.

3.09 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

GEOTECHNICAL PROFESSIONALS INC.

REVISED GEOTECHNICAL INVESTIGATION
PROPOSED PERFORMANCE ARTS CENTER
TEMPLE ACADEMY
635 N. CALIFORNIA AVENUE
LA PUENTE, CALIFORNIA

Prepared for:
Hacienda La Puente Unified School District
c/o Cumming Group
130 Vantis Drive, Suite 110
Aliso Viejo, CA 92656

Prepared by:
Geotechnical Professionals Inc.
5736 Corporate Avenue
Cypress, California 90630
(714) 220-2211

Project No. 3097.I

June 2, 2022 (Revision 2: September 25, 2023)

GEOTECHNICAL PROFESSIONALS INC.

June 2, 2022
(Revision 2: September 25, 2023)

Hacienda La Puente Unified School District
c/o Cumming Group
120 Vantis Drive, Suite 510
Aliso Viejo, California 92656

Attention: Mr. Bassam Raslan
Director

Subject: Report of Geotechnical Investigation (Revision No. 2)
Proposed Performance Arts Center
Temple Academy
635 N. California Avenue
La Puente, California
GPI Project No. 3097.I

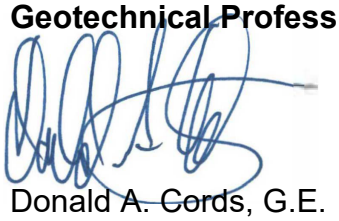
Dear Mr. Raslan:

Transmitted herewith is our revised report of geotechnical investigation for the subject project. The report presents our evaluation of the foundation conditions at the site and recommendations for design and construction. We have included our previous responses to comments in this revised report as requested by the Division of State Architect (DSA).

We are providing this report in an electronic format. We can provide wet-signed originals for agency submittal, if requested.

We appreciate the opportunity of offering our services on this project and look forward to seeing the project through its successful completion. Feel free to call us if you have any questions regarding our report or need further assistance.

Very truly yours,
Geotechnical Professionals Inc.



Donald A. Cords, G.E.
Principal

5736 Corporate Avenue • Cypress, CA 90630 • (714) 220-2211 , FAX (714) 220-2122

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1.0 INTRODUCTION

1.1 GENERAL

This report presents the results of the geotechnical investigation performed by Geotechnical Professionals Inc. (GPI) for the proposed performance arts center at Temple Academy in La Puente, California. The geographical site location is shown on the Site Location Map, Figure 1.

1.2 PROJECT DESCRIPTION

The proposed project will include a performance arts center building at an existing elementary school site. The building will be approximately 21,000 square feet in plan and one-story with up to 55-foot-high walls. We understand that footings may be up to 10 feet deep with a partial subterranean portion of the building. Additional details regarding the building are not yet available. The Site Plan, Figure 2, shows a preliminary footprint of the building at the school site.

We understand that storm water treatment devices, if feasible, will be included in the project. The location of the storm water treatment devices has not yet been determined.

Based on our experience with similar buildings and preliminary discussions with the Project Structural Engineer (Frank Rice of R.M. Byrd), we have assumed maximum column loads on the order of 200 to 300 kips and the maximum wall loads on the order of 9 to 12 kips per lineal foot. We understand that the walls will likely be constructed with masonry block. We anticipate that the planned grades for the project will be within about one foot of the existing grades except at the partial subterranean portion of the building.

Since structural loads or grades can significantly impact the performance of the proposed development, we should perform additional evaluations if the actual building loads or final grades vary significantly from those discussed herein.

1.3 PURPOSE OF INVESTIGATION

The primary purpose of this investigation and report is to provide an evaluation of the existing geotechnical conditions at the site as they relate to the design and construction of the proposed development. More specifically, this investigation was aimed at providing geotechnical recommendations for planning earthwork, and design of foundations, concrete slabs, and pavements.

1.4 PREVIOUS INVESTIGATION

GPI performed a geotechnical investigation for a future aquatic center in 2021 (Reference 1) located adjacent to the proposed site at the recreational field at Temple Academy. Our investigation included five hollow-stem auger borings, five Cone Penetration Tests (CPT's), and laboratory testing. The information contained in Reference 1 has been used to the extent possible in developing our recommendations for the performance arts center.

2.0 SCOPE OF WORK

Our scope of work for this investigation consisted of review of existing data, field exploration, laboratory testing, engineering analysis, and the preparation of this report.

Our fieldwork program consisted of four Cone Penetration Tests (CPT's) and one exploratory boring. The locations of the subsurface explorations are shown on the Site Plan, Figure 2.

The CPT's were advanced to depths ranging from 31 to 50 feet below existing site grades with refusal in dense soils in some CPT's prior to the planned depths. Detailed logs of the CPT's and a summary of the equipment used are presented in Appendix A. The exploratory boring was drilled using track mounted, limited access, hollow-stem auger drill rig to a depth of 91½ feet below existing site grade. Details of the drilling and the Log of Boring are presented in Appendix B.

Laboratory soil tests were performed on selected representative samples as an aid in soil classification and to evaluate the engineering properties of the soils. The geotechnical laboratory testing program included determinations of moisture content and dry density, grain size analysis, Atterberg limits, shear strength, consolidation, maximum density/optimum moisture, and corrosivity. Laboratory testing procedures and results are summarized in Appendix C.

Soil corrosivity testing was performed by HDR under subcontract to GPI. Their test results are presented in Appendix C.

We performed a geologic-seismic hazard evaluation of the site as presented in Appendix D. The geologic-seismic study was performed to meet the requirements of California Geologic Survey (CGS) – Note 48.

We performed a detailed geologic-seismic evaluation for the project, including site-specific response spectra, as required by the CGS Note 48 and in accordance with ASCE 7-16 (Reference 2). Details of our analysis are presented in Appendix E.

Engineering evaluations were performed to provide geotechnical and foundation recommendations. The results of our evaluations are presented in the remainder of this report.

3.0 SITE CONDITIONS

3.1 SURFACE CONDITIONS

The site is located at the southern portion of the Temple Academy in the area of three existing single-story classroom buildings. Historic aerial photographs (Reference 3) indicate that these classroom buildings have been located in this area since the school's construction between 1952 and 1964.

The proposed performance arts center site is bounded by single-story school buildings and a parking lot to the northwest, E. Temple Avenue to the southwest, single-story school buildings and athletic courts to the northeast, and a parking lot and N. California Avenue to the southeast.

The site is relatively flat with ground surface elevations ranging from approximately Elev. +311 feet at the south portion of the site to approximately Elev. +314 feet at the north portion of the site over a distance of about 300 feet.

3.2 SUBSURFACE SOILS

Our field investigation disclosed a subsurface profile consisting of minor amounts of undocumented fill soils overlying natural soils. Detailed descriptions of the conditions encountered are shown on the Logs of Explorations in Appendices A and B.

The fill soils, encountered in our boring to a depth of approximately 3 feet, consisted of sandy silts. Documentation regarding the placement and compaction of the fill was not provided.

In general, the underlying natural soils consist of interbedded silty sands, sandy silts, clayey silts, silts, and clays. In general, the silty sands and silts in the upper 20 to 30 feet are medium dense and firm to stiff. The natural soils in the upper 20 to 30 feet of the soil profile generally have moderate strength and compressibility characteristics. In general, the silty soils become stiffer and the sandy soils become denser at depths greater than about 20 to 30 feet below existing grade. Within the upper 10 feet, the soils are generally very moist to wet with and average moisture content of approximately 17 percent. The average moisture content is about 6 to 7 percent above the optimum moisture content. At a depth of 10 feet, we encountered a localized thin layer of silty clay with a moisture content of 32 percent. Based on testing at the adjacent site (Reference 1), the clayey soils, if encountered near the surface, can be anticipated to have a low expansion potential.

3.3 GROUNDWATER AND CAVING

Groundwater was not encountered in our boring drilled to a depth of 91½ feet below existing grade immediately after drilling. The historical high groundwater has been determined to be approximately 15 feet deep in the vicinity of the site by the State of California (Reference 4).

Groundwater was measured by others in a well located approximately 3,200 feet southwest of the site at a depth of 102 feet below grade (approx. Elev. +202 feet) in 2011 and in a well located approximately 3,700 feet northwest of the site at a depth of approximately 113 feet (approx. Elev. +197 feet) in 2020 (Reference 5).

Caving was not observed in our relatively small diameter, hollow stem auger boring. Caving was encountered in our CPTs between 29 and 35 feet below existing grades.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 GENERAL

Based on the results of our investigation, it is our opinion that from a geotechnical viewpoint it is feasible to develop the site as proposed.

The proposed performance arts center building may be supported on spread footings provided the static and seismic settlements are mitigated by ground improvement to magnitudes acceptable to the Project Structural Engineer. The most significant geotechnical issues that will affect the design and construction of the proposed structures are as follows:

- The site is located in a Seismic Hazard Zone as determined by the State of California. Layers of silty sand and sandy silt to depths of approximately 32 feet exhibit a potential for liquefaction during a design earthquake. If groundwater rises to the historical high level, we estimate that the maximum settlements at the site in the event of a design earthquake would be up to 1½ inches.

- Ground improvement can be performed to help limit total and differential settlements (static and seismic) of the proposed building to a magnitude acceptable to the Project Structural Engineer and to allow the building to be supported on conventional spread footings. Impact rammed aggregate piers are likely the most cost-effective method of ground improvement to limit settlements.

- If seismic settlements (liquefaction or dry) discussed in this report are not acceptable under the floor slab, impact rammed aggregate piers should be installed under the floor slab to mitigate seismic settlements to an acceptable level.

- Undocumented fills underlying the footprint of the building should be removed and replaced as properly compacted fill to support the floor slabs. Details are provided in the “Excavation” section of this report.

- On-site clayey soils are not suitable for direct support of the slab-on-grade floors and other flatwork. These improvements should be supported on at least 1 foot of non-expansive soils.

- Infiltration testing at the site will be required to determine the suitability for infiltration of storm water into the site soils. The tests will need to be performed at the location and depth of the proposed storm water treatment devices when provided by the Civil Engineer.

- The on-site soils should be considered moderately corrosive to buried metals. If buried metal elements are required, a corrosion engineer should be consulted.

Our recommendations related to the geotechnical aspects of the development of the site are presented in the subsequent sections of this report.

4.2 SEISMIC CONSIDERATIONS

4.2.1 General

The site is located in a seismically active area typical of Southern California and is likely to be subjected to strong ground shaking due to earthquakes on nearby faults.

We assume the seismic design of the proposed development will be in accordance with the 2019 California Building Code (CBC) criteria. For the 2019 CBC, a Site Class D (stiff soil) may be used. Using the Site Class, which is dependent on geotechnical issues, and the appropriate SEAOC/OSHPD web site (Reference 6), the corresponding seismic design parameters from the CBC are as follows:

2019 CBC:

S_S = 1.726g	$S_{MS} = F_a * S_S$ = 1.726g	$S_{DS} = 2/3 * S_{MS}$ = 1.151g
S_1 = 0.621g	$S_{M1} = F_V * S_1$ = 1.049g	$S_{D1} = 2/3 * S_{M1}$ = 0.700g

In accordance with the requirements of the 2019 CBC, ASCE 7-16, and CGS Note 48, the design spectral accelerations for the site should be determined based on a site-specific ground motion study. The details of our site-specific ground motion study are provided in Appendix E.

The Project Structural Engineer should determine the actual method of seismic design.

4.2.2 Strong Ground Motion Potential

Based on published information (Reference 7), the most significant faults in the proximity of the site are the San Jose and Whittier Faults, which are located about 5 miles from the site.

During the life of the project, the site will likely be subject to strong ground motions due to earthquakes on nearby faults. Based on the SEAOC/OSHPD website (Reference 6), we computed that the site could be subjected to a peak ground acceleration (PGA_M) of 0.81g. This acceleration has been computed using the mapped Maximum Considered Geometric Mean peak ground acceleration from ASCE 7-16 (Reference 2) and a site coefficient (F_{PGA}) based on Site Class. The structural design will need to incorporate measures to mitigate the effects of strong ground motion.

4.2.3 Potential for Ground Rupture

There are no known faults crossing or projecting through the site. The site is not located in an Alquist-Priolo Special Studies zone. Therefore, ground rupture due to faulting is considered unlikely at this site.

4.2.4 Liquefaction and Seismic Settlement

Soil liquefaction is a phenomenon in which saturated cohesionless soils undergo a temporary loss of strength during severe ground shaking and acquire a degree of mobility sufficient to permit ground deformation. In extreme cases, the soil particles can become suspended in groundwater, resulting in the soil deposit becoming mobile and fluid-like. Liquefaction is generally considered to occur primarily in loose to medium dense deposits of saturated cohesionless soils. Thus, three conditions are required for liquefaction to occur: (1) a cohesionless soil of loose to medium density; (2) a saturated condition; and (3) rapid large strain, cyclic loading, normally provided by earthquake motions.

The site is located within an area shown as having a potential for soil liquefaction, per the Seismic Hazards Mapping Act (Act). Specifically, the site is mapped within a Seismic Hazards Zone on the Baldwin Parks Quadrangle map (Reference 7). Inclusion of a site within a zone does not mean that a hazard exists at the site. It simply means that the characteristics of the site require investigation of the hazard.

The California Building Code (CBC), ASCE 7-16 (Reference 2), and Special Publication 117A (Reference 9) requires that the ground motion used for liquefaction evaluation be based on the Peak Ground Acceleration (PGA_M) adjusted for Site Class effects. Accordingly, we used a ground acceleration of 0.81g and a magnitude 6.9 earthquake for our analyses. The potential for liquefaction was evaluated using the methods presented in Robertson 2009 methodology (Reference 10) and modifications provided in Special Publication 117A.

To evaluate the potential for liquefaction at the site, we considered recent and historic groundwater levels. Groundwater was not encountered within depths of 91 feet in our boring. Nearby groundwater monitoring wells indicate groundwater at depths greater than 100 feet below existing grade. The historical high groundwater at the site is identified as 15 feet below existing grade by the State. We used the historical high groundwater depth of 15 feet for our evaluation, which appears very conservative based on recent data.

Based on our evaluation of the CPT data using computer software CLIQ (Reference 11), layers of silty sand and sandy silt between depths of approximately 15 to 24 feet and 28 to 32 feet exhibit a potential for liquefaction during a design earthquake. In the unlikely event that groundwater should rise to these levels, the estimated magnitude of induced settlement would be on the order of 1.5-inches or less at the site during a design earthquake. Differential settlement due to liquefaction across 40 feet could be on the order of ¾-inch or less. Appendix F includes the results of our liquefaction analysis.

Seismic ground subsidence, not related to liquefaction, occurs when loose, granular soils above the groundwater are densified during strong earthquake shaking. The 2019 California Building Code (CBC) and ASCE 7-16 (Reference 5) require that the ground motion used to evaluate seismic settlement be the same as the values used for the liquefaction analyses as discussed above. Based on our analyses, we estimate a potential dry seismic settlement of soils above the historical groundwater to be on the order of ¼-inch. The differential seismic settlement is estimated to be less than ¼-inch across a span of 40 feet. We estimate a potential dry seismic settlement of soils above the actual groundwater to be on the order of 1-inch or less at the site during a design

earthquake. Differential settlement due to dry seismic settlement across 40 feet could be on the order of ½-inch or less.

4.3 MITIGATION OF SETTLEMENT

Static settlement of shallow foundations for the performance arts center building is anticipated to be on the order of 1 inch or less with typical remedial grading under the foundations. Differential settlement from static loading across 40 feet could be on the order of ½ inch or less. As discussed above, the seismic settlement due to liquefaction and/or seismic ground subsidence are anticipated to be on the order of 1 to 1¾ inches in the event of a design level earthquake. Differential seismic settlement across 40 feet could be on the order of ½ to 1 inch. The building foundations should be designed for total and differential settlement for combined contribution from static and seismic sources.

Based on recent Division of State Architects (DSA) projects, we understand that the Project Structural Engineer, R.M. Byrd, will limit the building supported on spread footings and a slab-on-grade floor slabs to total settlement on the order of 1½ inches and differential settlements of ½ inch over 60 feet from both static and seismic sources. In order to limit the total settlement (static and seismic) under the building to acceptable limits for shallow foundations (spread or continuous footings), mitigation methods such as proprietary foundation/ground improvement methods will be required. While a structural alternative, such as a mat foundation or deep foundations (piles) could be used to support the building, we understand that ground improvement is more cost effective method than deep foundation and that a mat foundation is not economically feasible with the long spans associated with the performing arts center.

Ground improvement methods could be used to reduce the total and differential settlement from static and seismic sources under footings and the floor slab to magnitudes acceptable to the Project Structural Engineer. Potential ground improvement methods could consist of deep soil mixing (soil-cement columns), vibro-replacement (stone columns), or impact rammed aggregate piers. Based on our liquefaction analysis, we anticipate that ground improvement will be required to depths of at least 20 feet below building floor slabs or foundations to reduce the seismic settlement to acceptable limits.

Deep soil mixing involves the creation of soil/cement mixed columns extending through the soft compressible soil deposits and portion of the liquefiable soils. The resultant is similar to that of stone columns in that the method results in lower compressibility and increased shear strengths. Deep soil mixing can reduce both anticipated static and seismic settlement in both the siltier sands and the significant layers of cohesive soils at the site.

Vibro-replacement utilizes a large vibrating probe (mandrel) to create a cavity which is filled with gravel or crushed stone, and compacted as the mandrel is removed. The result is a stone column with the stone pushed laterally into the soil. Stone columns are typically more effective for densifying thicker, clean, loose sand layers, which are not prevalent at the site.

Impact rammed aggregate piers consist of drilled holes that are filled with aggregate base that is mechanically compacted as it is placed and were considered. Impact piers consist of a displacement type system that uses a steel pipe mandrel to penetrate through caving soils and construct aggregate piers from the bottom up. The end result is a dense column of aggregate surrounded by stiffened matrix soils that provide mitigation of liquefiable soil settlement and allow for higher bearing capacities.

Based on discussions with the project team, impact rammed aggregate piers are the most economical and preferred method to limit settlement under the footings of the building.

The impact rammed aggregate piers selected for this building will have to reduce the combined static and seismic settlements to a magnitude acceptable to the Structural Engineer (less than 1½ inches total and ½ inch differential) to utilize conventional foundations.

As discussed above, the total seismic settlement due to liquefaction under the slab-on-grade floor for the structure is estimated to be on order of 1½ inches during a design level earthquake. In order for this settlement to occur, the current groundwater level will need to rise from the current level estimated at greater than 90 feet below existing grade to the historical high level of 15 feet below existing grade. The likelihood of this rise in groundwater is remote. We estimated that dry seismic settlement of soils above the actual groundwater to be on the order of 1-inch or less at the site during a design earthquake. If these levels of settlement are not acceptable for the slab-on-grade floor, impact rammed aggregate piers should be installed under the floor slab to mitigate the settlement to an acceptable magnitude. Without this ground improvement, the floor slab of the building may be more heavily reinforced to mitigate distress or need to be repaired in the event of a design level earthquake.

Ground improvement is typically performed on a design-build basis by the specialty design-build contractor. The design and construction of the ground improvement is the sole responsibility of the specialty design-build contractor. At a minimum, we recommend that the specialty contractor achieve an allowable bearing pressure of 5,000 psf, total settlements (static plus seismic) of 1½ inches or less, and differential settlements of ½ inch or less over 60 feet for their foundation design parameters.

Our design review is typically limited to confirming that the soil parameters used are consistent with the data provided in this report. Western Ground Improvement (WGI) has been selected as the specialty design-build contractor for the ground improvement for the project. Based on our review of their submittals, WGI plans to install 24-inch diameter Geopiers (rammed aggregate pier) with a minimum shaft length of 20 feet and a spacing of 7 feet on center. Their design indicates that an allowable bearing pressure of 6,000 psf may be used for footings supported on the rammed aggregate piers resulting in a total settlement of less than 1½ inches and a differential settlement of less than ½ inch over 60 feet.

GPI provided a formal review dated September 20, 2023 (Reference 12) of the WGI submittal. Our review indicated that the Geopiers or other Rammed Aggregate Piers are suitable as the ground improvement for the project. The performance objectives of the reviewed Geopier system meet the performance objective of this report including

improved bearing capacity, control of long-term settlement, and seismic hazard mitigation. GPI takes no exception to the recommended depth, diameter, or spacing of the Geopiers such that it meets the performance objectives stated above. GPI has no authority or responsibility for the means, methods, sequences, techniques, or procedures of construction selected or used by the Contractor or its Subcontractors (including WGI). GPI shall not be responsible for the acts or omissions of the Contractor or its Subcontractors (including WGI).

We understand that the specialty design-build contractor will perform a program to monitor densification of granular soils from the ground improvement using cone penetration tests after the installation of the Geopiers with an analysis of cone penetration data to estimate total and differential settlement during a design seismic event. GPI takes no exception to the field-testing program provided by WGI. During the verification program for the rammed aggregate piers, GPI should observe the field testing, review the data, and independently confirm from the data that the rammed aggregate piers have improved the soils to meet the project settlement criteria.

A representative of GPI should observe the installation of the ground improvement on a full-time basis.

GPI can provide our report to ground improvement contractors if directed by the Owner and/or Structural Engineer.

4.4 EARTHWORK

The earthwork anticipated at the project site will consist of removal of undocumented fills and a portion of the low-density natural soils, excavations for the building foundation and utility lines, subgrade preparation, and the placement and compaction of fill.

4.4.1 Clearing

Prior to grading, the areas to be developed should be stripped of vegetation, pavements, foundations, and cleared of debris. Buried obstructions, such as utilities and tree roots, should be removed. Although none were encountered, cesspools or septic systems exposed during construction should be removed in their entirety. The resulting excavation should be backfilled as recommended in the "Subgrade Preparation" and "Placement and Compaction of Fills" sections of this report. As an alternative, cesspools can be backfilled with a lean sand-cement slurry. Deleterious materials generated during the clearing operations should be removed from the site. Inert demolition debris, such as concrete and asphalt may be crushed for reuse in engineered fills in accordance with the criteria presented in the “Materials for Fill” section of this report. At the conclusion of the clearing operations, a representative of GPI should observe and accept the site prior to further grading.

4.4.2 Excavations

Excavations at this site will include removal of undocumented fills and a portion of low density natural soils, soils disturbed during demolition, and trenching for new utility lines.

Prior to placing fills or construction of foundations or floor slabs, the undocumented fill beneath the building pad should be removed and replaced as properly compacted fill. For planning purposes, removals should extend at least 3 feet below existing grades or 1 foot below the bottom of the floor slab, whichever is deeper.

The base of the excavations should extend laterally beyond the edge of building, if space is available, for a distance of at least 5 feet or equal to the depth of fill below the bottom of the floor slab, whichever is greater.

For other minor structures (site walls, trash enclosure, etc.), removals should extend at least 3 feet below grade or 2 feet below the base of foundations, whichever is deeper. The base of the excavations should extend laterally beyond the edge of footings for minor structures, if space is available, for a distance of at least equal to the depth of fill below the bottom of the footings.

For new pavement and flatwork subgrade, removals should extend at least 1 foot below existing grades or proposed subgrade, whichever is deeper.

The actual depths of removals should be determined in the field during grading by a representative of GPI.

Temporary construction excavations may be made vertically without shoring to a depth of 4 feet below adjacent grade. For deeper cuts up to 10 feet, the slopes should be properly shored or sloped back to at least 1:1 or flatter. Excavations that extend below an imaginary plane, inclined at 45 degrees below the edge of any adjacent existing site facilities, should be properly shored to maintain support of adjacent elements. Excavations and shoring systems should meet the minimum requirements given in the most current State of California Occupational Safety and Health Standards.

Excavations performed within a 1:1 extending from the bottom of the excavation to an adjacent rammed aggregate pier element should be analyzed by the specialty designer of the rammed aggregate pier and GPI on a case-by-case basis.

In areas where removals are performed adjacent to property lines, existing pavements, or other improvements where temporary slopes are not feasible, “ABC” slot cuts may be utilized instead of shoring. The slots should be no wider than 8 feet and no deeper than 6 feet and should be backfilled immediately to finish grade prior to excavation of the adjacent two slots on each side.

Excavation of the soils at the site should be readily achieved using conventional methods. The contractor should determine the best method for removal based on the subsurface conditions outlined herein.

4.4.3 Subgrade Preparation

After removals are complete and prior to placing fills or construction of the proposed structures, the subgrade soils should be scarified to a depth of 12 inches, moisture-conditioned, and compacted to dry densities equal to at least 90 percent of the maximum dry density as determined in accordance with ASTM D 1557.

To reduce the potential for subgrade disturbance, subgrade processing requirements may be waived if wet subgrade conditions are encountered, as determined by GPI in the field during grading. Where exposed, care should be taken to prevent the soils from drying out during construction. Soils allowed to dry out prior to covering will require moisture conditioning and additional processing.

The fine grained subgrade soils may locally exhibit over-optimum conditions. Subjecting these materials to heavy rubber-tired equipment is expected to induce pumping/rutting, possibly requiring stabilization with geogrid and aggregate base on deeper removals. It is our opinion that steel track/wheel equipment will minimize disturbance of these materials. The contractor should review the data presented and determine the appropriate type of equipment to minimize disturbance of the over optimum soils.

4.4.4 Material for Fill

The existing site soils are, in general, suitable for use as compacted fill. However, the on-site silts and clays should not be used as retaining wall backfill. The on-site clays should not be used within 1 feet of at-grade concrete slabs or pedestrian flatwork.

Imported fill material should be predominately granular (containing no more than 40 percent fines - portion passing No. 200 sieve) and non-expansive (Expansion Index of 20 or less). GPI should be provided with a sample (at least 50 pounds) and notified of the location of soils proposed for import at least 72 hours in advance of importing. Each proposed import source should be sampled, tested and accepted for use prior to delivery of the soils to the site. Soils imported prior to acceptance by GPI may be rejected if not suitable.

On-site inert demolition debris, such as concrete and asphalt, may be reused in the compacted fills provided approval is obtained from the reviewing regulatory agency and the Owner. The material should be crushed to the consistency of aggregate base and blended with the on-site or imported soils. The recycled material may be used for non-expansive fill or aggregate base under slab-on-grade floors and exterior flatwork.
Soils used for compacted fills should not contain particles greater than 6 inches in size.

If used as fill, open-graded gravel, such as pea gravel or crushed rock, should be placed in lifts of not more than 12 inches thick and densified with vibratory or impact compaction equipment. In addition, such materials should be separated from the adjacent soil with a suitable filter fabric, such as Mirafi 140N or equivalent.

4.4.5 Placement and Compaction of Fills

Fill soils should be placed in horizontal lifts, moisture-conditioned, and mechanically compacted to at least 90 percent of the maximum dry density, in accordance with ASTM D-1557. Fill soils placed within 12 inches of pavement subgrade should be compacted to at least 95 percent of the maximum dry density, in accordance with ASTM D-1557.

The moisture content of the on-site clays and silts should be between 1 to 3 percent over the optimum moisture content to readily achieve the required degree of compaction. The moisture content of the on-site or import sands should be between 0 to 2 percent over the

optimum moisture content to readily achieve the required degree of compaction. The on-site clays and silts near the existing surface are above the optimum moisture content such that some moisture-conditioning (drying) during grading will likely be required. The contractors should allow for moisture conditioning of these materials in their bids.

4.4.6 Shrinkage and Subsidence

Shrinkage is the loss of soil volume caused by compaction of fills to a higher density than before grading. Subsidence is the settlement of in-place subgrade soils caused by loads generated by large earthmoving equipment. For earthwork estimating purposes, an average shrinkage value of 10 to 15 percent and subsidence of 0.1 feet may be assumed for the surficial soils for earthwork volume estimating purposes. Actual shrinkage and subsidence will depend on the types of earthwork equipment used and can be determined during grading.

4.4.7 Observation and Testing

A representative of GPI should observe excavation bottoms, subgrade preparation, and fill placement activities. Sufficient in-place field density tests should be performed during fill placement and in-place compaction to evaluate the overall compaction of the soils. Soils that do not meet minimum compaction requirements should be reworked and tested prior to placement of any additional fill.

4.4.8 Trench/Wall Backfill

Utility trench backfill should be mechanically compacted in lifts. Wall backfill should consist of the imported sandy soils or silty sands and sands that appear to be available in deeper excavations for the swimming pools. Lift thickness should not exceed those values given in the "Compacted Fill" section of this report. Jetting or flooding of backfill materials should not be permitted. A representative of GPI should observe and test trench and wall backfills as they are placed.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, sand-cement slurry may be substituted for compacted backfill. The slurry should contain at least 1½ sacks of cement per cubic yard and have a maximum slump of 5 inches. Within building areas, the slurry should contain two sacks of cement per cubic yard.

4.5 FOUNDATIONS

4.5.1 General

The proposed building may be supported on conventional isolated and/or continuous shallow spread footings with slab-on-grade floors provided the subsurface soils are prepared in accordance with the recommendations given in this report. The spread footings will require the installation of ground improvement, such as impact rammed aggregate piers, under the footings to control static and seismic settlement.

Minor structures (site walls, trash enclosure, etc.) may also be supported on conventional isolated and/or continuous shallow footings. Shallow foundations for the minor structure should be supported on properly compacted fill as discussed in the Earthwork section.

Foundation bottoms should be moistened immediately prior to placement of concrete.

4.5.2 Shallow Foundations

The design and construction of the ground improvement are the sole responsibility of the design-build specialty contractor. In addition, foundation design parameters, including allowable bearing capacity and estimated settlements of the spread footings bearing on ground improvement, must be provided by the design-build specialty contractor.

For the performance arts center building, we recommend that the specialty contractor achieve the following allowable bearing pressures for the minimum footing widths and embedments as shown below:

STATIC BEARING PRESSURE (psf)	MINIMUM FOOTING WIDTH (inches)	MINIMUM FOOTING* EMBEDMENT (inches)
5,000	60	24
4,500	48	24
4,000	36	24
3,000	24	24
2,500	18	18

* Refers to minimum depth below lowest adjacent grade.

Total static and seismic settlement of the footings for the performance arts center building should be limited to 1½ -inch or less. Maximum differential settlements should be limited to ½-inch or less between similarly loaded adjacent footings or across a span of 60 feet.

For other at-grade, lightly-loaded structures, a static allowable net bearing pressure of up to 2,000 pounds per square foot (psf) may be used for minor structures based on the shear strength and elastic settlement characteristics of the natural site soils or properly compacted fill. These bearing pressures are for dead-plus-live loads, and may be increased one-third for short-term, transient, wind and seismic loading. The actual bearing pressure used may be less, such that economics and structural loads will determine the minimum width for footings as discussed below. The maximum edge pressures induced by eccentric loading or overturning moments should not be allowed to exceed these recommended values.

The following minimum footing widths and embedments are recommended for the corresponding allowable bearing pressure.

STATIC BEARING PRESSURE (psf)	MINIMUM FOOTING WIDTH (inches)	MINIMUM FOOTING* EMBEDMENT (inches)
2,000	24	24
1,500	18	18

* Refers to minimum depth below lowest adjacent grade.

A minimum footing width of 18 inches should be used even if the actual bearing pressure is less than 1,500 psf as shown above.

Total static settlement of the footings for minor structures is expected to be on the order of ¾-inch or less. Maximum differential settlements are expected to be less than ½-inch between similarly loaded adjacent footings or across a span of 40 feet.

The anticipated seismic settlement caused by liquefaction (1½-inch total and ¾-inch differential) should be added to the above estimated static settlements when evaluating the total settlement of the structures not supported on ground improvement.

The above estimates are based on the assumption that the recommended earthwork will be performed and that the footings will be sized in accordance with our recommendations.

4.5.3 Lateral Load Resistance

Soil resistance to lateral loads will be provided by a combination of frictional resistance between the bottom of foundations and underlying soils and by passive soil pressures acting against the embedded sides of the footings. For frictional resistance, a coefficient of friction of 0.30 (FS=1.5) may be used for design. For footings supported on ground improvement, a coefficient of friction should be supplied by the design-build specialty contractor. In addition, an allowable lateral bearing pressure equal to an equivalent fluid weight of 275 pounds per cubic foot may be used, provided the footings are poured tight against compacted fill soils. These values may be used in combination without reduction.

The special contractor of the rammed aggregate piers recommended a coefficient of friction of 0.45 between the foundation interface and the rammed aggregate pier element, which GPI takes no exception to this value.

4.5.4 Foundation Concrete

Laboratory testing by HDR (Appendix C) indicates that the site soils exhibit a soluble sulfate content 29 mg/kg (0.003 percent by weight). For the 2019 CBC, foundation concrete should conform to the requirements for negligible sulfate exposure as outlined in ACI 318, Section 4.3 (Category S0). Chloride levels in the sample of the soils tested were found to be 14 mg/kg, which is considered to be low (Category C1). The results of the corrosion testing are presented in Appendix C.

4.5.5 Footing Excavation Observation

Prior to placement of concrete and steel, a representative of GPI should observe and approve foundation excavations.

4.6 BUILDING FLOOR SLABS

Slab-on-grade floors should be supported on at least 1 foot of non-expansive (Expansion Index of 20 or less), compacted soils as discussed in the “Placement and Compaction of Fill” section. If the seismic settlements (liquefaction or dry) discussed in this report are

not acceptable under the floor slab, impact rammed aggregate piers should be installed under the floor slab to mitigate seismic settlements to an acceptable level.

For elastic design of slabs-on-grade supporting sustained concentrated loads, a modulus of subgrade reaction (k) of 28 pounds per cubic inch (pounds per square inch per inch of deflection) may be used for the on-site soils. As provided by the specialty design-build contractor, a k of 250 pounds per cubic inch may be used for rammed aggregate pier supported floor slabs. The structural design should consider both long-term loads related to building operations and short-term construction loads. GPI takes no exception to the above values from a geotechnical standpoint.

A vapor/moisture retarder should be placed under slabs that are to be covered with moisture-sensitive floor coverings (parquet, vinyl tile, etc.) or will be storing moisture sensitive supplies. Currently, common practice is to use a 15 mil polyolefin product such as Stego Wrap for this purpose. Whether to place the concrete slab directly on the vapor barrier or place a clean sand layer between the slab and vapor barrier is a decision for the Project Architect, as it is not a geotechnical issue. If covered by sand, the sand layer should be about 2 inches thick and contain less than 5 percent by weight passing the No. 200 sieve. Based on our explorations and laboratory testing, the soils at the site are not suitable for this purpose. The function of the sand layer is to protect the vapor retarder during construction and to aid in the uniform curing of the concrete. This layer should be nominally compacted using light equipment. The sand placed over the vapor retarder should only be slightly moist. If the sand gets wet (for example as a result of rainfall or excessive moistening) it must be allowed to dry prior to placing concrete. Care should be taken to avoid infiltration of water into the sand layer after placement of the concrete slab, such as at slab cut-outs and other exposures. A sand layer is not required beneath the vapor retarder, but we take no exception if one is provided.

It should be noted that the material used as a vapor retarder is only one of several factors affecting the prevention of moisture accumulation under floor coverings. Other factors include maintaining a low water to cement ratio for the concrete used for the floor slab, effective sealing of joints and edges (particularly at pipe penetrations), as well as excess moisture in the concrete. The manufacturer of the floor coverings should be consulted for establishing acceptable criteria for the condition of floor surface prior to placing moisture-sensitive floor coverings.

4.7 LATERAL EARTH PRESSURES

The following recommendations are provided for retaining walls that do not extend more than 12 feet in height. We recommend that conventionally constructed walls be backfilled with sandy (granular) soils, appear to be available in limited quantities onsite with selective grading.

Active earth pressures can be used for designing walls that can yield at least ½-inch laterally in 10 feet of wall height under the imposed loads. For level backfill comprised of non-expansive granular soils (no more than 40 percent passing No. 200 U.S. standard sieve), the magnitude of active pressures are equivalent to the pressures imposed by a fluid weighing 35 pounds per cubic foot (pcf). This pressure may also be used for the design of temporary excavation support. For the natural on-site soils, the magnitude of

active pressures are equivalent to the pressures imposed by a fluid weighing 47 pounds per cubic foot (pcf) for level backfill.

At-rest pressures should be used for restrained walls that remain rigid enough to be essentially non-yielding, such as for the basement walls. At-rest pressures for non-expansive granular soils are equivalent to the pressures imposed by a fluid weighing 55 pcf. At-rest pressures for on-site natural soils are equivalent to the pressures imposed by a fluid weighing 67 pcf.

To account for seismic loads, an additional lateral earth pressure equal to 24 pcf (equivalent fluid pressure distribution) should be added to the above active pressure. If the wall is designed using the above at-rest pressures, the lateral earth pressure combined with a seismic load should be limited to 59 or 71 pcf (equivalent fluid pressure distribution) for granular non-expansive or on-site silt/clay soils, respectively.

Walls subject to surcharge loads should be designed for an additional uniform lateral pressure equal to one-third and one-half the anticipated surcharge pressure for unrestrained and restrained walls, respectively. The basement walls for the partial subterranean portion of the building should be designed to resist the loading of adjacent foundations or the foundations should be stepped to lessen the loading on the basement wall.

The wall backfill for conventional walls should be well-drained to relieve possible hydrostatic pressure or designed to withstand these pressures. A drain consisting of perforated pipe and gravel wrapped in filter fabric should be used. One cubic foot of rock should be used for each lineal foot of pipe. The fabric (non-woven filter fabric, Mirafi 140N or equivalent) should be lapped at the top. We prefer pipe and gravel drains to weep holes to avoid any potential for constant flow of surface water.

The Structural Engineer should specify the use of select, granular wall backfill on the plans for retaining walls that are to be conventionally backfilled. Wall footings should be designed as discussed in the "Foundations" section.

4.8 CORROSION

Soil corrosivity testing was performed by HDR under subcontract to GPI. The corrosivity test results are presented in Appendix C. The on-site soils should be considered moderately corrosive to buried metals. If corrosion consultation is required, a corrosion engineer such as HDR should be consulted.

4.9 EXTERIOR CONCRETE AND MASONRY FLATWORK

Exterior concrete, masonry flatwork and pedestrian pavers should be supported on a layer of non-expansive, compacted fill. The use of the clayey soils within 1 foot of exterior concrete should not be permitted unless differential heaving is tolerable. Prior to placement of concrete, the subgrade should be prepared as recommended in “Subgrade Preparation” section. The moisture content of subgrade soils should be maintained above the optimum moisture content and confirmed by a representative of GPI prior to covering.

Subgrade soils allowed to dry out will require moisture conditioning, including the potential for additional processing.

Pedestrian pavers should be supported on a minimum of 1 inch of clean bedding sand over 4 inches of aggregate base. Pavers for pedestrian traffic should be a minimum of $2^3/_8$ inches (60 mm) thick. Base course materials should be compacted to at least 95 percent of the maximum dry density (ASTM D1557). Aggregate base should conform to the requirements of Section 200-2 of the Standard Specifications for Public Works Construction (Green Book) for CAB materials.

In areas where landscaping is planned adjacent to hardscape, we recommend a cut-off be provided at the edge of the hardscape to reduce the potential for irrigation water to migrate laterally under the hardscape. Such a cut-off could consist of a deepened curb or turned down slab edge extending below the 1-foot layer of non-expansive fill.

We recommend the Project Civil Engineer design the concrete hardscape and sidewalks, including determination of thickness and reinforcing. For exterior flatwork, hardscape, and sidewalks, we recommend a minimum slab thickness of 4 inches with minimum slab reinforcement of No. 3 rebar placed at 18 inches on-center, in both directions. Control joints to direct shrinkage cracking in exterior slabs and sidewalks should be provided at maximum spacing of 8 and 6 feet on center in two directions, respectively. These recommendations should be considered as minimums based on the geotechnical site conditions, and the Project Civil Engineer should confirm if more stringent recommendations are needed for other purposes.

4.10 STORM WATER INFILTRATION

Current regulations require that storm water be infiltrated into the site soils of new developments when possible. The soil types present at the site control the ability of water to infiltrate into the subgrade.

When the location and depth of the proposed storm water treatment devices are provided by the Civil Engineer, infiltration testing at the site will be required to determine the suitability for infiltration of storm water into the site soils. The infiltration testing should be performed in accordance with methods established by the County of Los Angeles (Reference 13). After completion of the site-specific infiltration testing, we will issue a separate stand-alone report providing our findings.

At the adjacent site within the athletic fields of Temple Academy, we tested the infiltration of site soils at depths of approximately 6½ feet and 10 feet below the existing grades (Reference 1). The measured and design infiltration rates at these depths were significantly lower than the minimum acceptable rate of 0.3 inches per hour in the County guidelines (Reference 13). The low infiltration rates can likely be attributed to the adjacent site soils having significant interbedded thin layers of clayey silts and sandy silts and fine silty sands in the upper 10 feet of the site soil profile. At the project site, similar soils exist in the upper 10 feet of the soil profile. Based on our explorations for the performance arts center, potentially more favorable soils exist at depths of 10 to 20 feet in portions of the project site.

If storm water is infiltrated into the subsurface soils, we recommend that the infiltration devices not be located within 50 feet of buildings (existing and new) or sensitive structures due to the underlying potentially liquefiable soils at the site.

4.11 PAVED AREAS

Based on the near surface soils and R-value testing of a sample of the upper soils at the adjacent site, preliminary pavement design can be based on an R-value of 15. The California Division of Highways Design Method was used for design of the recommended preliminary flexible pavement sections. The PCA Manual (PCA, 1981) was used for design of the recommended preliminary concrete pavement sections. The following pavement sections are recommended for planning purposes only.

Preliminary Pavement Sections

PAVEMENT AREA	TRAFFIC INDEX	SECTION THICKNESS (inches)	
		Asphalt Concrete	**Aggregate Base Course**
Auto Parking	4	3	6
Circulation Drives	5	3	8
Truck Drives	6	3	12
		Portland Cement Concrete	**Aggregate Base Course**
Auto Parking	4	6.5	4
Circulation Drives	5	7	4
Truck Drives	6	7.5	4

If vehicular pavers are to be used for the project, the paver and leveling sand may be supported on the thickness of aggregate base shown above for the appropriate traffic index. Pavers for vehicular traffic should be a minimum of $3^1/_8$ inches (80 mm) thick.

The pavement subgrade underlying the aggregate base or concrete should be properly prepared and compacted in accordance with the recommendations outlined under "Subgrade Preparation".
The portland cement concrete used for paving should have a modulus of rupture of at least 550 psi (equivalent to an approximate compressive strength of 3,700 psi) at the time the pavement is subjected to truck traffic.

The pavement base course (as well as the top 12 inches of the subgrade soils) should be compacted to at least 95 percent of the maximum dry density (ASTM D-1557). Aggregate base should conform to the requirements of Section 26 of the California Department of Transportation Standard Specifications for Class II aggregate base (three-quarter inch maximum) or Section 200-2 of the Standard Specifications for Public Works Construction (Green Book) for untreated base materials, excluding processed miscellaneous base.

The above recommendations are based on the assumption that the base course and compacted subgrade will be properly drained. The design of paved areas should incorporate measures to prevent moisture build-up within the base course which can otherwise lead to premature pavement failure. For example, curbing adjacent to

landscaped areas should be deep enough to act as a barrier to infiltration of irrigation water into the adjacent base course.

4.12 GEOTECHNICAL OBSERVATION AND TESTING

We recommend that a representative of GPI observe earthwork during construction to confirm that the recommendations provided in our report are applicable during construction. The earthwork activities include grading, compaction of fills, subgrade preparation, pavement construction and foundation excavations. If conditions are different than expected, we should be afforded the opportunity to provide an alternate recommendation based on the actual conditions encountered.

5.0 LIMITATIONS

The report, exploration logs, and other materials resulting from GPI's efforts were prepared exclusively for use by the Hacienda La Puente Unified School District and their consultants in designing the proposed development. The report is not intended to be suitable for reuse on extensions or modifications of the project or for use on any project other than the currently proposed development as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report are provided to contractors or included in specifications, it should be understood that they are provided for information only.

Soil deposits may vary in type, strength, and many other important properties between points of exploration due to non-uniformity of the geologic formations or to man-made cut and fill operations. While we cannot evaluate the consistency of the properties of materials in areas not explored, the conclusions drawn in this report are based on the assumption that the data obtained in the field and laboratory are reasonably representative of field conditions and are conducive to interpolation and extrapolation.

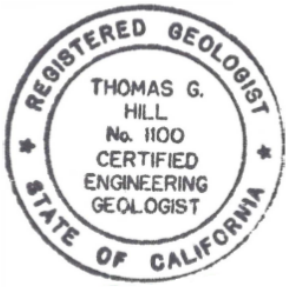
Furthermore, our recommendations were developed with the assumption that a proper level of field observation and construction review will be provided during grading, excavation, and foundation construction by GPI. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations. If construction phase services are performed by others they must accept full responsibility for all geotechnical aspects of the project including this report.

Our investigation and evaluations were performed using generally accepted engineering approaches and principles available at this time and the degree of care and skill ordinarily exercised under similar circumstances by reputable Geotechnical Engineers practicing in this area. No other representation, either expressed or implied, is included or intended in our report.

Respectfully submitted,
Geotechnical Professionals Inc.

Donald A. Cords, G.E.
Principal

Paul R. Schade, G.E.
Principal



Thomas G. Hill, C.E.G.
Consulting Geologist

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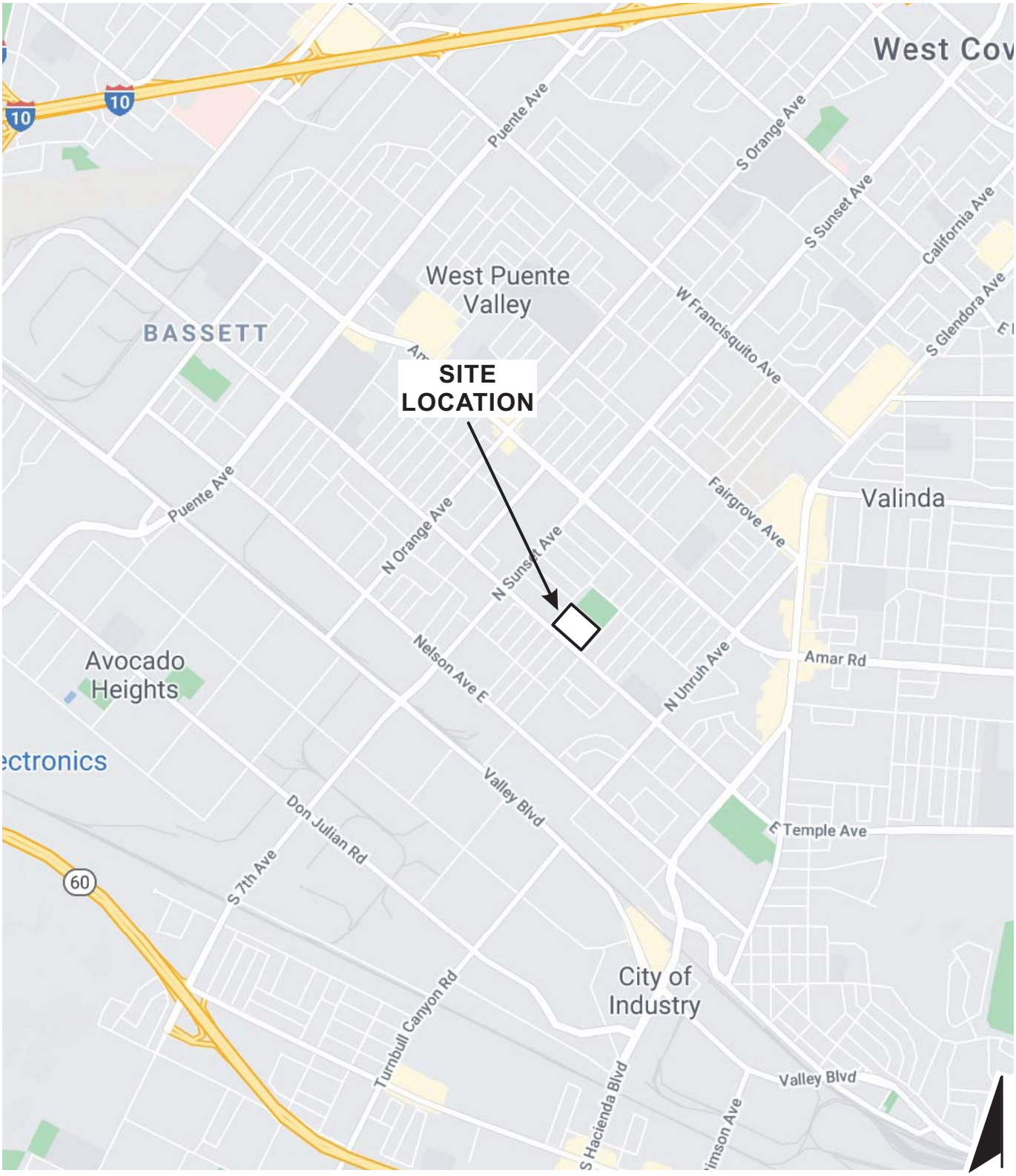

GEOTECHNICAL PROFESSIONALS, INC.

PERFORMANCE ARTS CENTER

GPI PROJECT NO.: 3097.I | SCALE: 1" = 3000'

SITE LOCATION MAP

FIGURE 1

N

0 100 200 FEET

EXPLANATION

B-1 APPROXIMATE LOCATION OF EXPLORATORY BORING

C-4 APPROXIMATE LOCATION OF CONE PENETRATION TEST

APPROXIMATE FOOTPRINT OF PROPOSED BUILDING

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SCALE: 1" = 100'

SITE PLAN

FIGURE 2

APPENDIX A

APPENDIX A

CONE PENETRATION TESTS

The subsurface conditions were investigated by performing four Cone Penetration Tests (CPT's) at the site. The soundings were advanced to depths of 31 to 50 feet below existing grades. The locations of the CPT's are shown on the Site Plan, Figure 2.

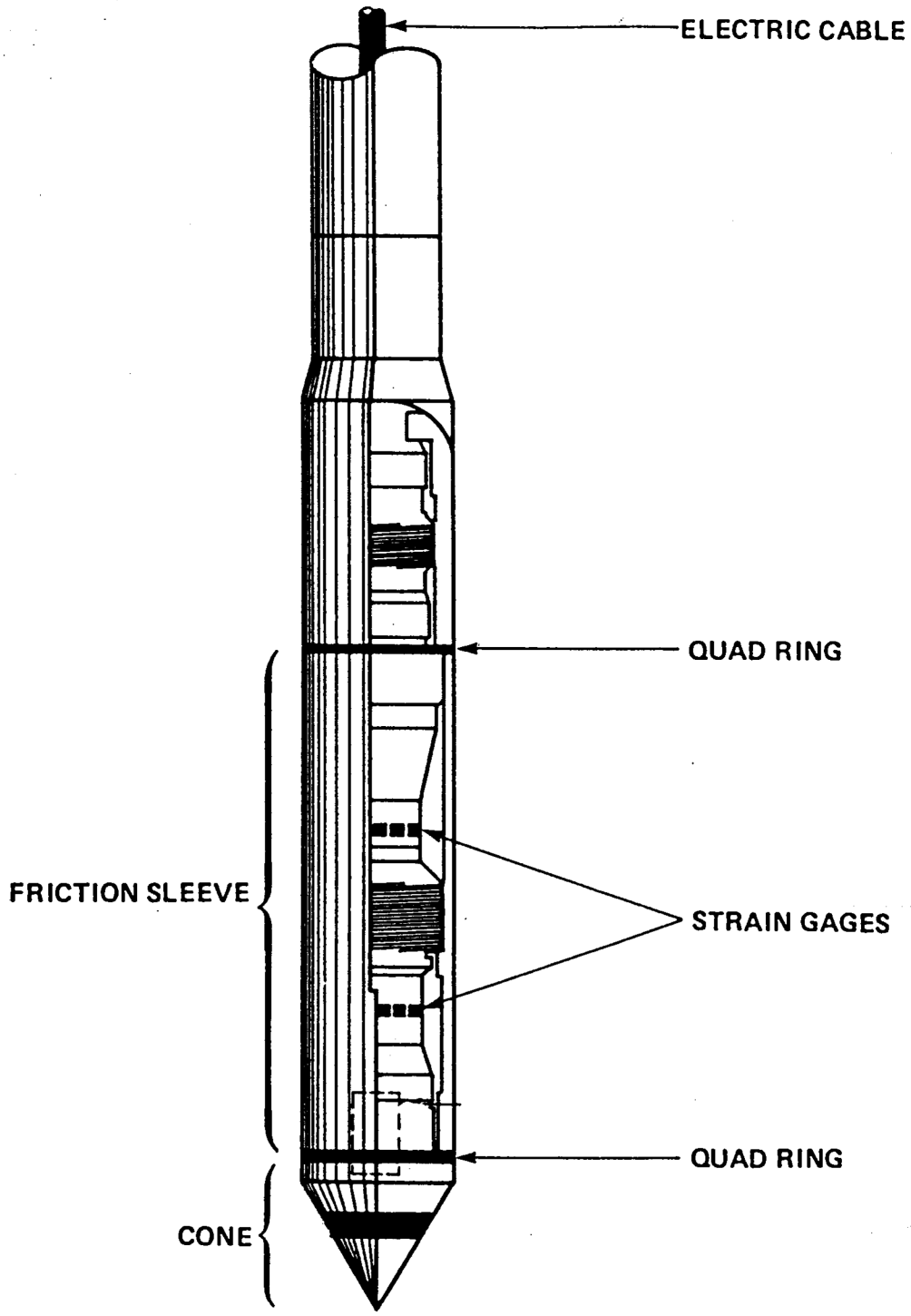
The Cone Penetration Test consists of pushing a cone-tipped probe into the soil deposit while simultaneously recording the cone tip resistance and side friction resistance of the soil to penetration (refer to Figure A-1). The CPT's described in this report were conducted in general accordance with ASTM specifications (ASTM D 5778) using an electric cone penetrometer.

The CPT equipment consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to push the cone and rods into the soil while a continuous record of cone and friction resistance versus depth is obtained in both analog and digital form at the ground surface.

Data obtained during a CPT consists of continuous stratigraphic information with close vertical resolution. Stratigraphic interpretation is based on relationships between cone tip resistance and friction resistance. The calculated friction ratio (CPT friction sleeve resistance divided by cone tip resistance) is used as an indicator of soil type. Granular soils typically have low friction ratios and high cone resistance, while cohesive or organic soils have high friction ratios and low cone resistance. These stratigraphic material categories form the basis for all subsequent calculations, which utilize the CPT data.

Computer plots of the reduced CPT data acquired for this investigation are presented in Figures A-2 through A-5 of this appendix. The field testing and computer processing for CPT's was performed by Kehoe Testing under subcontract to Geotechnical Professionals Inc. (GPI). The interpreted soil descriptions were prepared by GPI.

The CPT locations were laid out in the field by measuring from existing features at the site. Upon completion, the CPT hole was backfilled above caving with a bentonite plug. The ground surface elevations at the CPT locations were estimated from Google Earth and should be considered very approximate.



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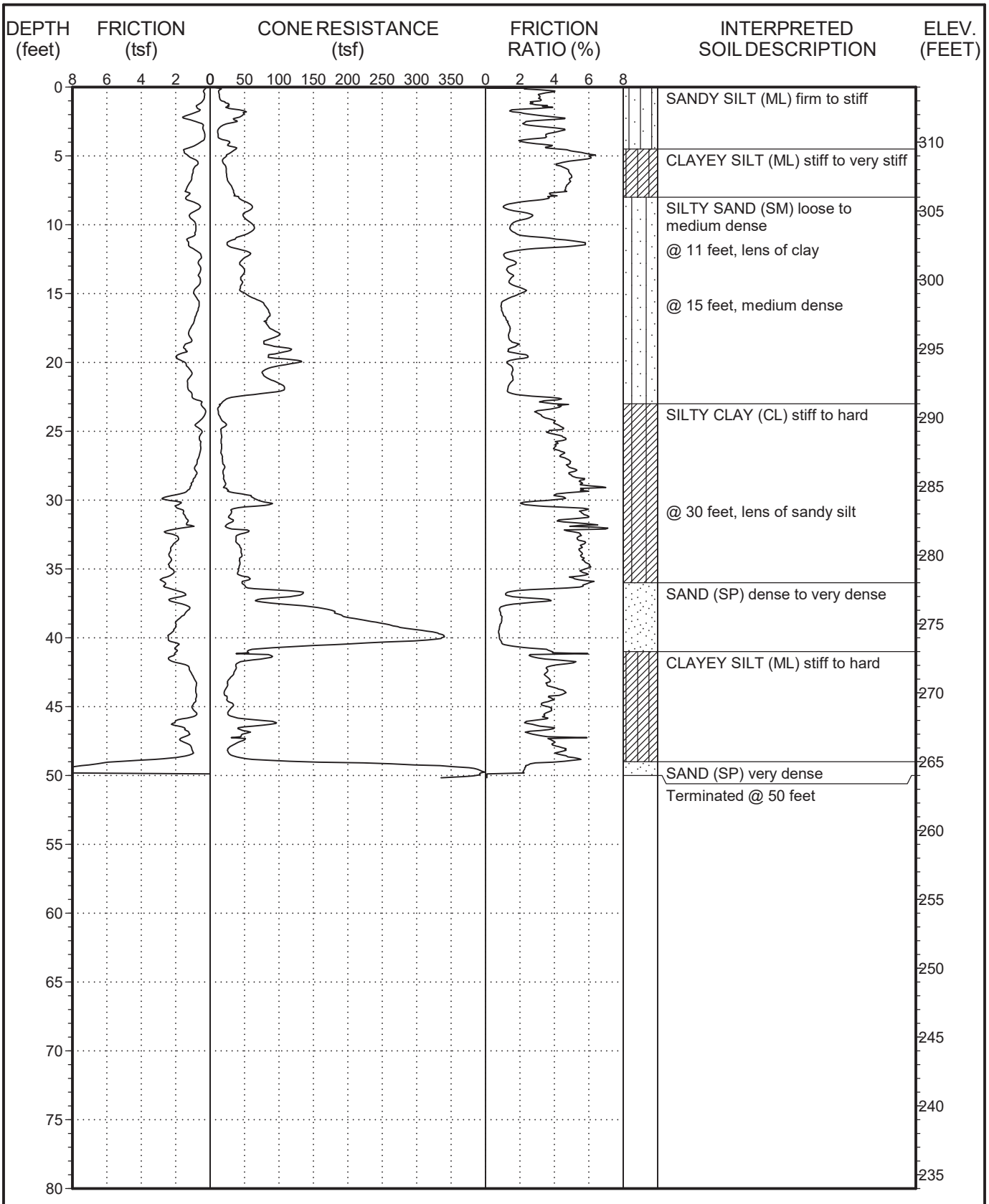
CONE PENET O ETER

FIGURE



Date performed:1-4-22

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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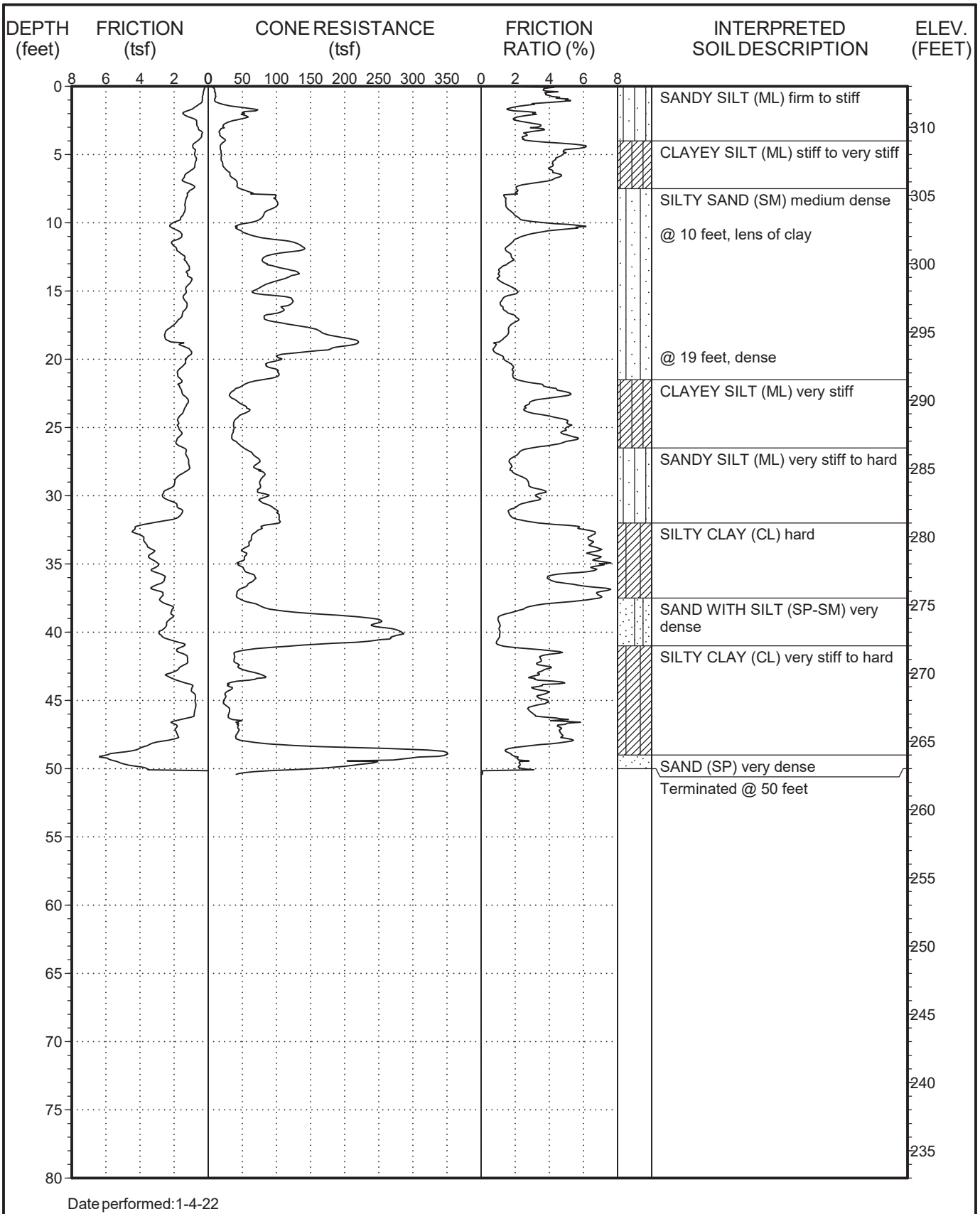
LOG OF CPT NO. C-1

FIGURE A-2



Date performed:1-4-22

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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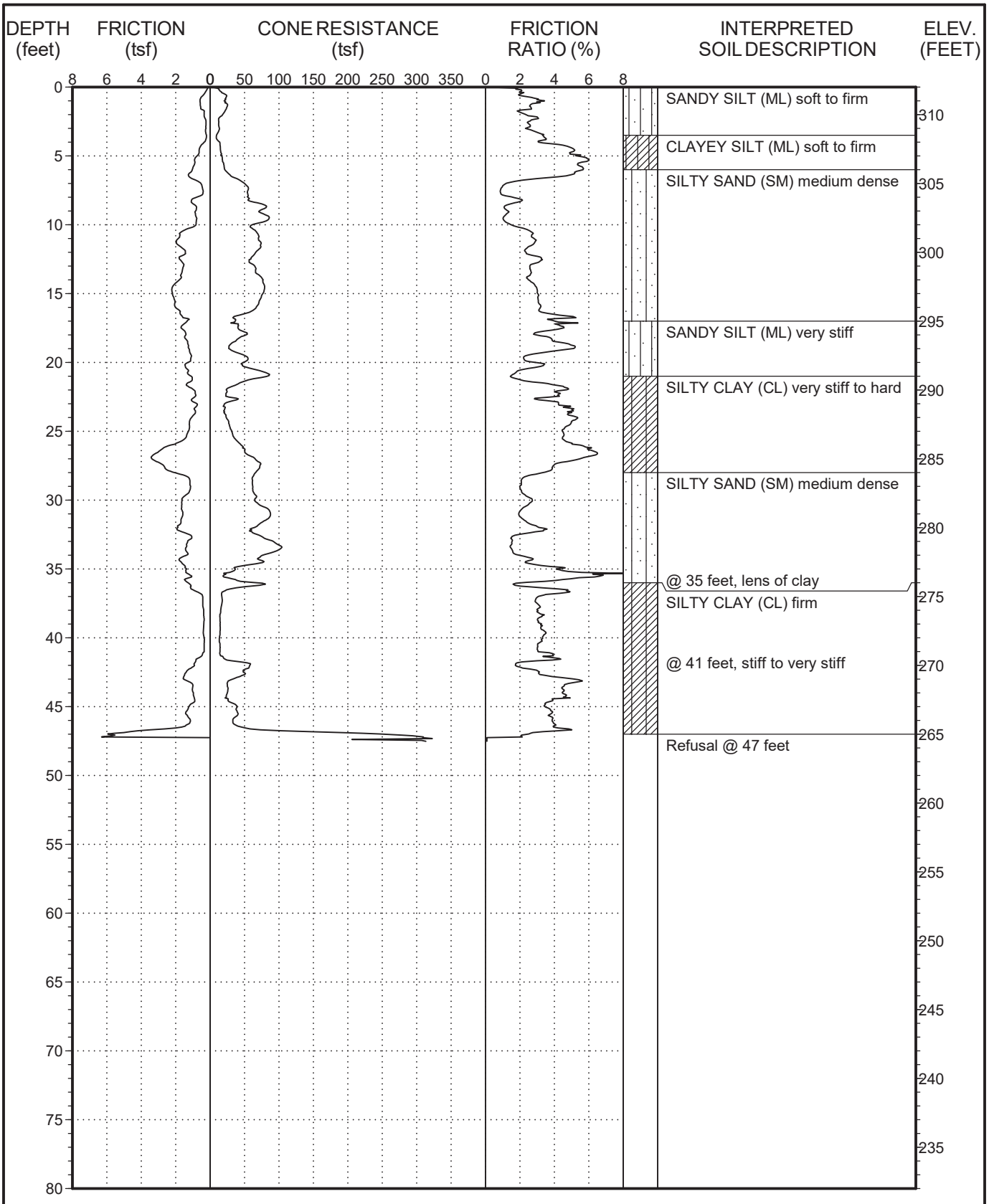
LOG OF CPT NO. C-2

FIGURE A-3



Date performed:1-4-22

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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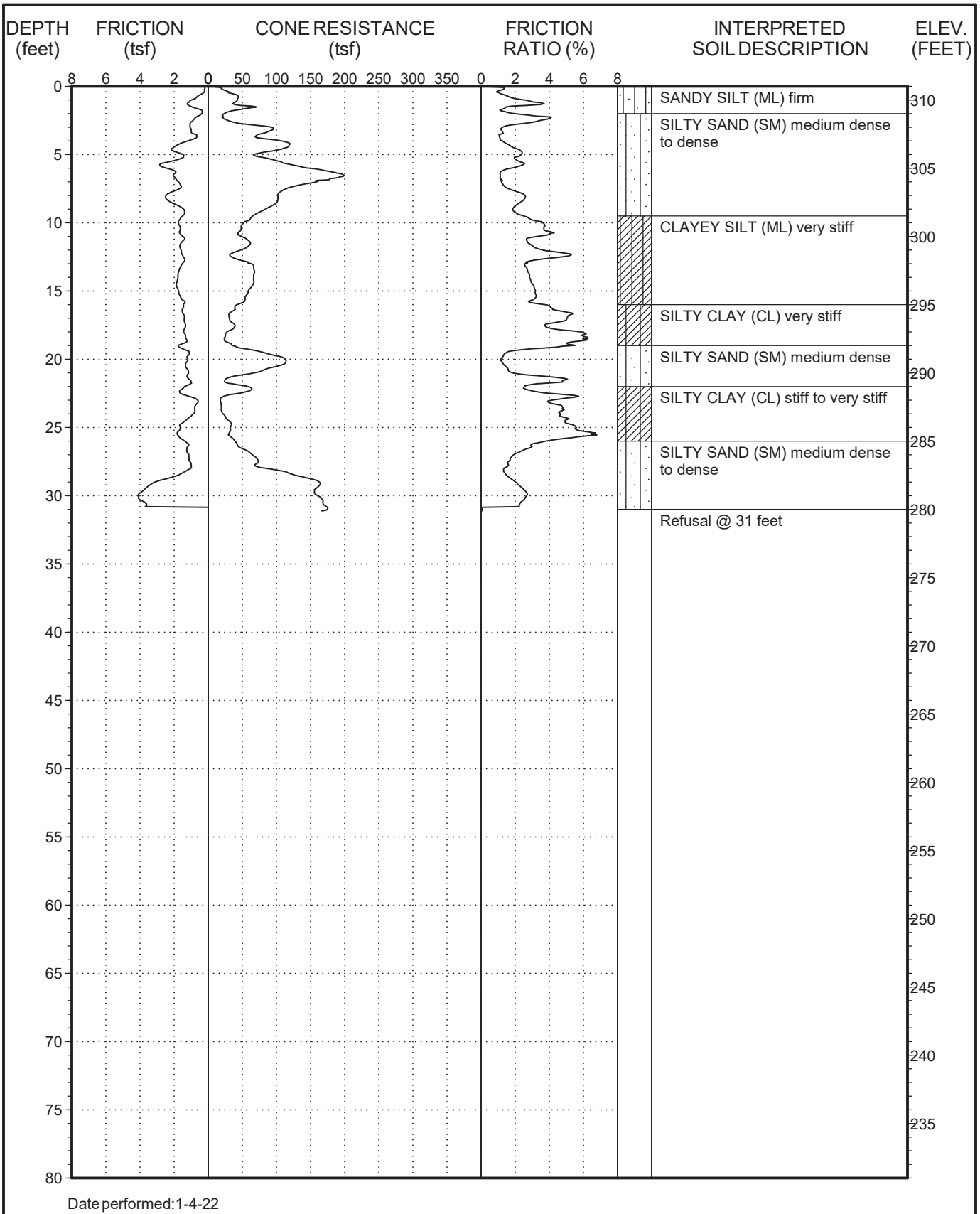
PROJECT NO.: 3097.I
PERFORMANCE ARTS CENTER

LOG OF CPT NO. C-3

FIGURE A-4



Date performed:1-4-22

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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PERFORMANCE ARTS CENTER

LOG OF CPT NO. C-4

FIGURE A-5

APPENDIX B

APPENDIX B

EXPLORATORY BORINGS

The subsurface conditions at the site were investigated by drilling and sampling one exploratory boring. The boring was advanced to a depth of 91½ feet below the existing ground surface. The exploration location is shown on the Site Plan, Figure 2.

The boring was drilled using truck-mounted hollow-stem auger equipment. Relatively undisturbed samples were obtained using a brass-ring lined sampler (ASTM D 3550). The brass-rings have an inside diameter of 2.42 inches. The ring samples were driven into the soil by a 140-pound hammer dropping 30 inches. The number of blows needed to drive the sampler into the soil was recorded as the penetration resistance.

At selected locations, disturbed samples were obtained using a split-spoon sampler by means of the Standard Penetration Test (SPT, ASTM D 6066). The spoon sampler was driven into the soil by a 140-pound hammer dropping 30 inches, employing the “free-fall” hammer described above. After an initial seating drive of 6 inches, the number of blows needed to drive the sampler into the soil a depth of 12 inches was recorded as the penetration resistance. These values are the raw uncorrected blowcounts.

The field exploration for the investigation was performed under the continuous technical supervision of GPI's representative, who visually inspected the site, maintained detailed logs of the borings, classified the soils encountered, and obtained relatively undisturbed samples for examination and laboratory testing. The soils encountered in the boring were classified in the field and through further examination in the laboratory in accordance with the Unified Soils Classification System. A detailed log of the boring is presented in Figure B-1 in this appendix.

The boring location was laid out in the field by measuring from existing features at the site. Upon completion, the boring was backfilled with the excavated soil cuttings. The ground surface elevation at the boring location was estimated from Google Earth and should be considered very approximate.

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
			B	0	Fill: **SANDY SILT (ML)** black, very moist, firm	
17.3	107	10	D			310
					Natural: **SANDY SILT (ML)** black, wet, stiff	
18.6	105	14	D	5		
					SILTY SAND (SM) brown, very moist, loose to medium dense	
15.7	113	26	D			
						305
14.9	103	11	D		@ 8.5 feet, olive brown	
				10		
32.3	87	9	D		**SILTY CLAY (CL)** brown, wet, firm	
8.4	96	33	D		**SILTY SAND (SM)** olive brown, slightly moist, medium dense, trace gravel	300
				15		
15.5	97	23	D		**SILT (ML)** olive brown, very moist, very stiff	
						295
				20		
14.2		11	S		@ 20.5 feet, wet, stiff	
						290
					SANDY SILT (ML) dark brown, wet, stiff, trace clay	
21.8	102	21	D	25	**CLAY (CL)** brown, very moist, stiff, with sand	
						285
				30		
17.5		17	S		**CLAYEY SILT (ML)** grey brown, very moist, very stiff, trace sand	
						280
					SILTY SAND (SM) brown, moist, dense, with fine gravel	
8.0	111	53	D	35		
						275

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 1-6-22

EQUIPMENT USED: 8 " Hollow Stem Auger-LAR

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 3097.I

PERFORMANCE ARTS CENTER

LOG OF BORING NO. B-1

FIGURE B-1

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
14.3		42	S	40	**SILTY SAND (SM)** brown, very moist, dense	270
21.8	103	27	D	45	**SANDY SILT (ML)** dark brown, wet, very stiff	265
25.7		19	S	50	**CLAY (CL)** dark olive brown, wet, very stiff, trace sand	260
15.8	112	41	D	55	**CLAYEY SAND (SC)** brown, very moist, medium dense **SAND (SW)** brown, moist, very dense, with gravel	255
3.0		88	S	60	@ 60 feet, dry	250
		97/10"	D	65		245
5.5		63	S	70	**SAND WITH SILT (SP-SM)** light olive brown, slightly moist, very dense, with gravel	240
3.4	99	87/10"	D	75	**SAND (SP)** light brown, slightly moist, very dense	235

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 1-6-22

EQUIPMENT USED: 8 " Hollow Stem Auger-LAR

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 3097.I

PERFORMANCE ARTS CENTER

LOG OF BORING NO. B-1

FIGURE B-1

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
2.6		66	S	80	**SAND (SP)** light olive brown, dry, very dense, with gravel	230
2.2	115	50/4"	D	85	@ 88 feet, brown	225
17.4		41	S	90	**SANDY SILT (ML)** brown, very moist, hard	
					Total Depth 91.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 1-6-22

EQUIPMENT USED: 8 " Hollow Stem Auger-LAR

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 3097.I

PERFORMANCE ARTS CENTER

LOG OF BORING NO. B-1

FIGURE B-1

APPENDIX C

APPENDIX C

LABORATORY TESTS

INTRODUCTION

Representative undisturbed soil samples, and bulk samples were carefully packaged in the field and sealed to prevent moisture loss. The samples were then transported to our Cypress office for examination and testing assignments. Laboratory tests were performed on selected representative samples as an aid in classifying the soils and to evaluate the physical properties of the soils affecting foundation design and construction procedures. Detailed descriptions of the laboratory tests are presented below under the appropriate test headings. Test results are presented in the figures that follow.

MOISTURE CONTENT AND DRY DENSITY

Moisture content and dry density were determined from a number of the ring samples from the borings. The samples were first trimmed to obtain volume and wet weight and then were dried in accordance with ASTM D 2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. Moisture content and dry density values are presented on the boring logs in Appendix B.

ATTERBERG LIMITS

Liquid and plastic limits were determined for selected samples in accordance with ASTM D4318. Results of the Atterberg Limits test are summarized on Figure C-1.

PERCENT PASSING NO. 200 SIEVE

Three soil samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. That portion of the material retained on the No. 200 sieve was oven-dried and weighed to determine the percentage of the material passing the No. 200 sieve. A summary of the percentages passing the No. 200 sieve is presented below.

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	PERCENT PASSING No. 200 SIEVE
B-1	0-5	Sandy Silt (ML)	52
B-1	15	Silt (ML)	88
B-1	25	Clay (CL)	76

DIRECT SHEAR

Direct shear tests were performed on undisturbed samples in accordance with ASTM D 3080. The sample was placed in the shear machine, and pre-selected normal loads were applied. The samples were inundated, allowed to consolidate, and then were sheared to failure at a strain rate of 0.001 inches per minute. The tests were repeated on additional test specimens under increased normal loads. Shear stress and sample deformation were monitored throughout the test. The results of the direct shear test are presented in Figure C-2.

CONSOLIDATION

One-dimensional consolidation tests were performed on undisturbed samples in accordance with ASTM D 2435. After trimming the ends, the sample was placed in the consolidometer and loaded to up to 0.4 ksf. Thereafter, the sample was incrementally loaded to a maximum load of up to 25.6 ksf. The sample was inundated at 1.6 ksf. Sample deformation was measured to 0.0001 inch. Rebound behavior was investigated by unloading the sample back to 0.4 ksf. Results of the consolidation tests, in the form of percent consolidation versus log pressure, are presented in Figures C-3 and C-4.

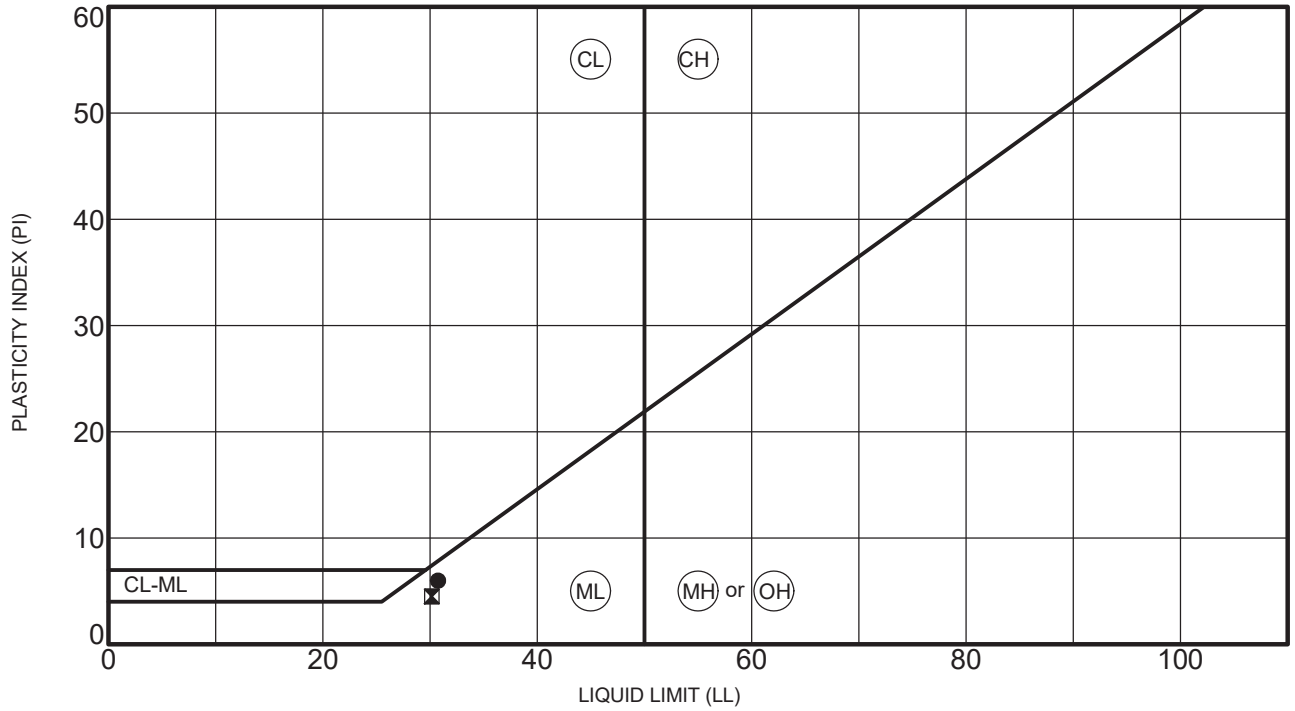
COMPACTION TEST

A maximum dry density/optimum moisture test was performed in accordance with ASTM D1557 on representative bulk samples of the surficial soils. The test results are as follows.

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)
B-1	0 – 5	Sandy Silt (ML)	10.5	123

CORROSIVITY

Soil corrosivity testing was performed by HDR on soil samples provided by GPI. The test results are summarized in Table 1 of this appendix.



	SAMPLE LOCATION		LL	PL	PI	Fines, %	Classification
●	B-1	20.0	31	25	6		SILT (ML)
⊠	B-1	30.0	30	26	5		CLAYEY SILT (ML)

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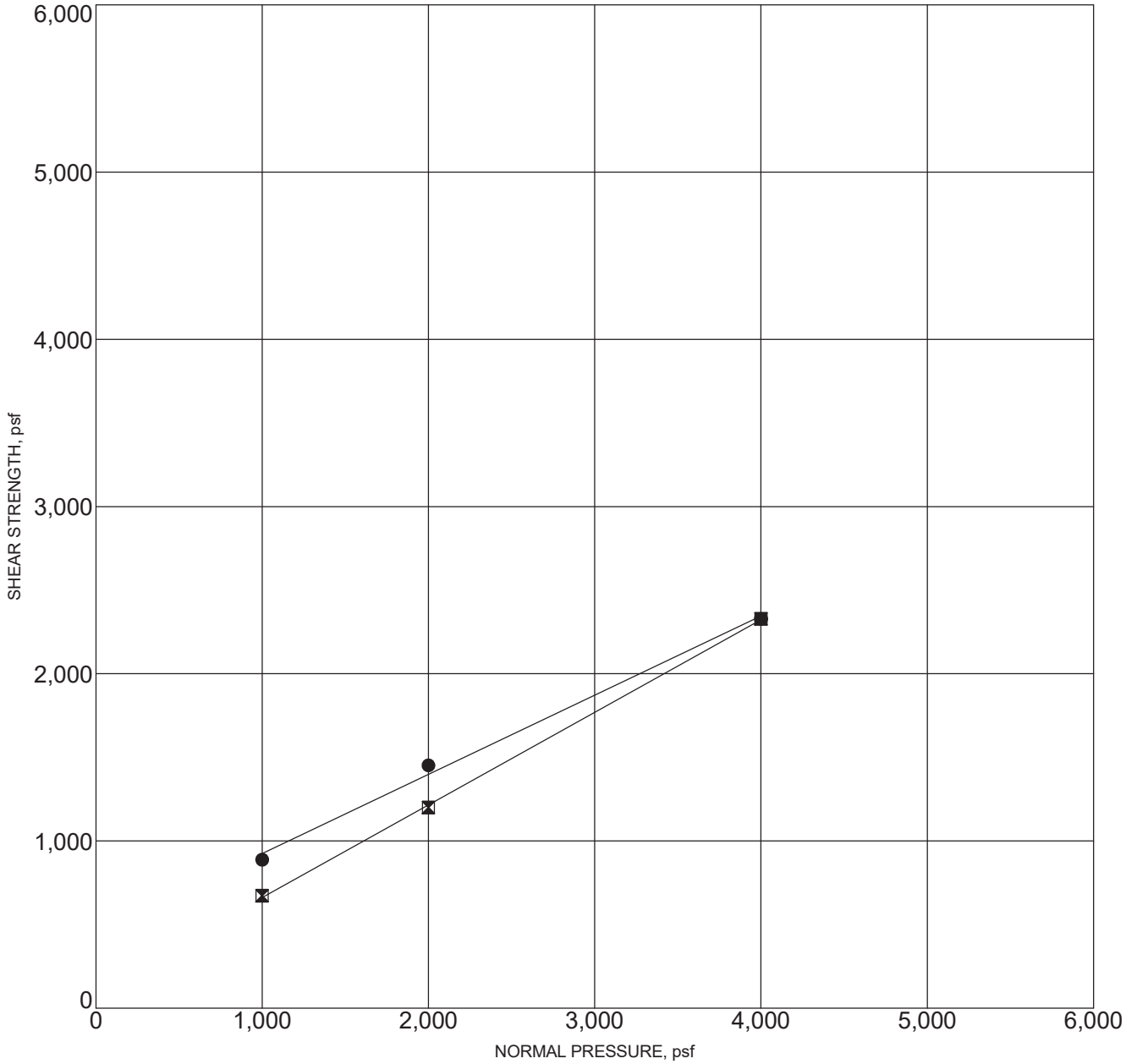
ATTERBERG LIMITS TEST RESULTS

FIGURE C-1



● **PEAK STRENGTH**
Friction Angle= 25 degrees
Cohesion= 450 psf

⧓ **ULTIMATE STRENGTH**
Friction Angle= 29 degrees
Cohesion= 108 psf

Sample Location		Classification	DD,pcf	MC,%
B-1	6.0	SILTY SAND (SM)	113	15.7

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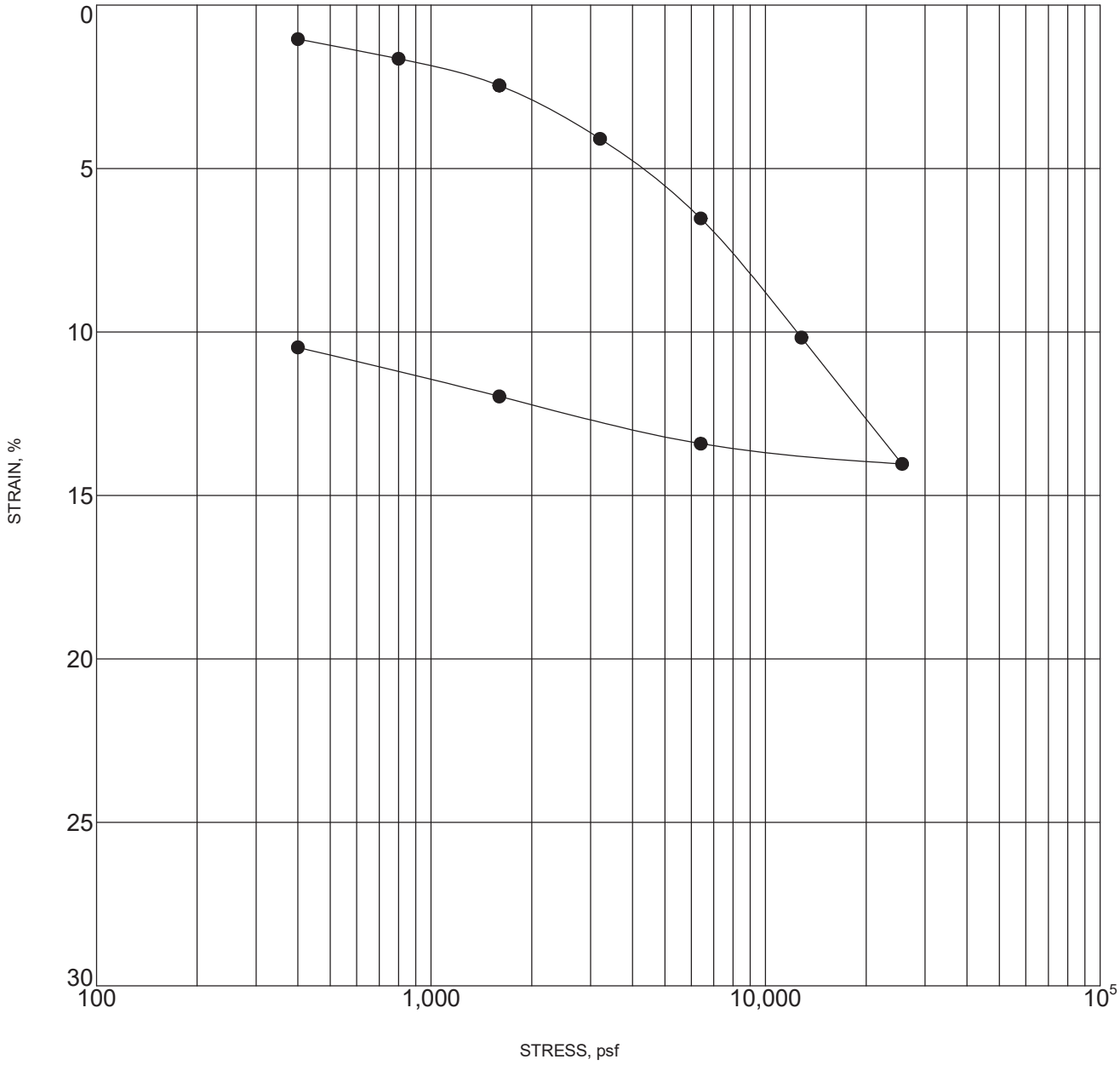
DIRECT SHEAR TEST RESULTS

FIGURE C-2



Sample inundated at 1600 psf

	Sample Location		Classification	DD,pcf	MC,%
●	B-1	10.0	SILTY CLAY (CL)	87	32.3

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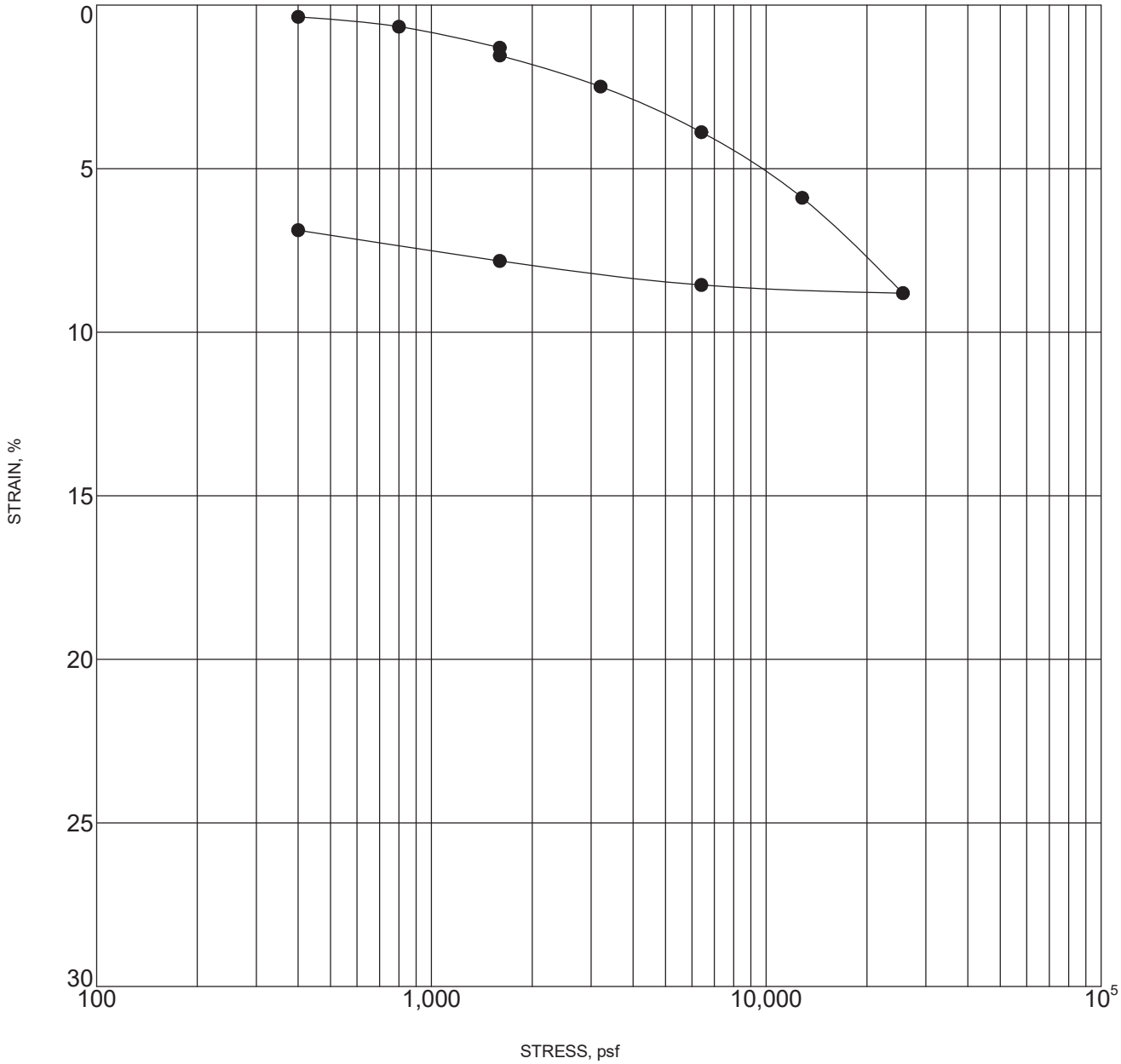
CONSOLIDATION TEST RESULTS

FIGURE C-3



Sample inundated at 1600 psf

	Sample Location		Classification	DD,pcf	MC,%
●	B-1	15.0	SILT (ML)	97	15.5

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CONSOLIDATION TEST RESULTS

FIGURE C-4

Table 1 - Laboratory Tests on Soil Samples

Geotechnical Professionals, Inc.
Temple Academy
Your #3097.I, HDR Lab #22-0069LAB
13-Jan-22

Sample ID			B-1 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	3,200
saturated		ohm-cm	2,360
pH			6.7
Electrical Conductivity		mS/cm	0.13
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	58
magnesium	Mg^{2+}	mg/kg	16
sodium	Na^{1+}	mg/kg	50
potassium	K^{1+}	mg/kg	25
ammonium	NH_4^{1+}	mg/kg	ND
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	378
fluoride	F^{1-}	mg/kg	7.8
chloride	Cl^{1-}	mg/kg	14
sulfate	SO_4^{2-}	mg/kg	29
nitrate	NO_3^{1-}	mg/kg	28
phosphate	PO_4^{3-}	mg/kg	16
Other Tests			
sulfide	S^{2-}	qual	na
Redox		mV	na

Resistivity per ASTM G187, pH per ASTM G51, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

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APPENDIX D

APPENDIX D

GEOLOGIC-SEISMIC HAZARD EVALUATION

INTRODUCTION

This geologic and seismic assessment presents a summary of geologic and seismic conditions at Temple Academy located at 635 N. California Avenue in La Puente, California. The purpose of this assessment was to identify and evaluate the geologic and seismic hazards that may affect the proposed performance arts center at the subject site. In order to accomplish this objective, the following scope of services was performed:

- Research and review of available published and unpublished geologic literature and maps pertaining to the site and vicinity (see References), as well as subsurface exploration data from our recent investigation.

- Geologic analysis of the reviewed information.

- Preparation of this assessment report, which includes a summary of the researched information and a discussion of the possible geologic-seismic hazards that may affect the subject site and the proposed development.

The subject site is located at Latitude 34.03789° and Longitude -117.96351.

SITE CONDITIONS

The school is located along the southern portion of La Puente at the corner of E. Temple Avenue and N. California Avenue at a distance of about 2 miles north of the Pomona Freeway. Topography of the surrounding area is generally flat with a slight slope to the south. The general topography at the Temple Academy and surrounding athletic field indicates slightly less than ¾ percent downgrade slope to the south. The elevations within the campus range from approximately +317 feet in the north to approximately +311 feet in the south. The approximate elevations in the area of the proposed new performance arts building are +311 to +314 feet.

The proposed development will consist of the demolition of three existing classrooms and playground area, and the construction of a new two-story high-performance arts center.

Based on a review of historical photographs (Historic Aerials), the school campus appears to have been graded and constructed between 1952 and 1964. In 1952, the entire campus areas consisted of agricultural fields with one single family home near the footprint of the future performing arts center.

REGIONAL AND LOCAL GEOLOGIC SETTING

Regional Geology

The proposed school site is located in the northeast portion of a regional geologic structure termed the Los Angeles Basin, a northeast-trending structural basin filled with Tertiary age marine sedimentary rocks mantled by recent and Pleistocene age non-marine alluvial sediments deposited by washes and streams flowing southward from the San Gabriel Mountains and Repetto Hills to the north of the site.

Regionally the site is within the Peninsular Ranges Geomorphic Province. The Peninsular Ranges are characterized by northwesterly trending active faults and mountain ranges related to the San Andreas and other major fault systems in the province. The province extends from the Los Angeles Basin, where the project is located, southeast to Baja California.

Site Geologic Conditions

The site is underlain by Quaternary age alluvial sediments mapped as younger, undissected alluvial deposits. These sediments are described as weakly consolidated gravel, sand and silt (Dibblee, 1989). The geologic conditions in the site area are shown on the quaternary Geologic Map, Figure D-1.1. The local site geology is shown on Figure D-1.2 and a geologic subsurface section is shown on Figure D-1.3.

As encountered in our exploratory borings to depths of 91 feet, the soils consist of minor amounts of undocumented fill soils over natural younger alluvial fan deposits. The fill soils at the boring locations consisted predominately of sandy silts. In general, the fills were very moist and firm. The fill soils are likely undocumented and relatively old, given the age of the school. The thickness of the fills at our boring was approximately 3 feet. The underlying alluvial deposits consisted predominantly of silty sands sandy silts, and silts with intermittent layers of clayey silts and clays. The natural soils are generally very moist to wet and stiff to very stiff and medium dense to dense.

Groundwater Conditions

Data published by the State of California indicates a shallowest depth to groundwater of approximately 15 feet at the subject site (CGS, 1998). Based on the prevailing site grades of the school, this corresponds to approximate elevations of +299 feet. Details of the historical high groundwater depths in the vicinity of the site are shown on the Historic Groundwater Map, Figure D-2.

Groundwater was not encountered within the 91½ foot depth explored during our investigation. Groundwater was measured by others in a monitoring well located approximately 3,200 feet southwest of the site at a depth of 102 feet below grade (approx. Elev. +202 feet) in 2011 and in a monitoring well located approximately 3,700 feet northwest of the site at a depth of approximately 113 feet (approx. Elev. +197 feet) in 2020 (County of Los Angeles).

TECTONIC SETTING

Regional Fault Systems

The geologic structure of southern California is dominated by northwest trending faults associated with the San Andreas Fault System. Faults such as the Newport-Inglewood, Whittier, Palos Verdes Hills and San Jacinto are all considered active and are all associated with the San Andreas, which collectively form the boundary between the North American and Pacific tectonic plates. Most of these faults have ruptured the ground surface historically and/or produced significant earthquakes.

Anomalous to the general northwest structural fabric are a series of active west trending reverse or thrust faults. The majority of these occur as north dipping planes projecting along the southern base of the Santa Monica and San Gabriel Mountains in the greater Los Angeles area.

The known active thrust faults in the region include the Cucamonga, Sierra Madre, San Fernando, Raymond, Santa Monica and Hollywood faults.

Concealed Faults

Another category of fault known as "blind thrusts" was recognized as a significant seismic hazard following the 1987 magnitude 6.0 Whittier Narrows Earthquake and then again by the 1994 San Fernando magnitude 6.7 Earthquake. A blind thrust is a deeply buried shallow dipping thrust fault, which does not project to the ground surface. Blind thrusts are capable of generating a major earthquake that may cause uplift in the form of anticlinal hills. Some uplands that surround the Los Angeles Basin, including the Elysian Park and Repetto Hills, are products of blind thrusts. Because blind thrusts do not intersect the ground surface, primary surface fault rupture is considered unlikely. Major portions of the Los Angeles Basin are now believed to be underlain by various blind thrusts ramps. Due to continued north-south convergence (shortening) across the Los Angeles Basin, slippage along these features will generate earthquakes.

At the present time, the potential magnitudes and recurrence intervals of blind thrust produced earthquakes cannot be quantified with confidence due to the fact that many characteristics of these features (including areal extent and Quaternary slip rates) are poorly understood. Nonetheless, the proximity to densely populated urban centers and their history of producing damaging earthquakes clearly demonstrate the risk that blind thrusts pose to large metropolitan areas such as Los Angeles and surrounding cities.

Nearby Seismogenic Sources

We reviewed the 2008 National Seismic Hazard Maps Source Parameters (USGS, 2008) to identify known active faults within a 100 kilometer radius of the project site. The names and distances of the faults lying with 40 kilometers of the project site are provided in the following table (Table 1). We present a map showing the significant regional faults in Figure D-3, Regional Fault Map.

Table 1 – Significant Regional Faults

Fault Name	Approximate Distance* (km)
San Jose	7.7
Elsinore	7.8
Sierra Madre	12.6
Puente Hills (Santa Fe Springs)	12.9
Elysian Park (Upper)	13.1
Raymond	13.9
Clamshell-Sawpit	15.8
Puente Hills (Los Angeles)	16.9
Puente Hills (Coyote Hills)	17.5
Chino	20.1
Verdugo	20.4
Cucamonga	23.7
Hollywood	26.3
Santa Monica (connected)	30.7
Newport-Inglewood	31.3
San Joaquin Hills	38.1

* Defined as the closest distance to projection of rupture area along fault trace.

The site does not lie within an Alquist-Priolo Earthquake Fault Zone as designated by the California Geological Survey (CGS, 2017). Surface faults have not been mapped projecting towards or through the site area.

Brief details for some of the Holocene active faults closest to the subject site are as follows:

San Jose Fault

Details of the San Jose Fault are poorly understood due to a lack of seismicity on the fault. The fault is classified as a left-lateral, strike slip fault with a length of approximately 18 kilometers, with a slip rate estimated between 0.2 and 2.0 mm/yr. A ML5.4 earthquake in February, 1990 has been attributed to the fault. The recurrence interval is unknown.

Elsinore Fault

The Elsinore fault zone is one of the largest in Southern California extending approximately 300 kilometers in a roughly southeast-northwest direction from Julian to Whittier. In the northern end near the project site, the Elsinore Fault splays into two segments the Chino Fault and the Whitter Fault. The Elsinore Fault has been assigned a maximum magnitude of 7.5 and a slip rate of roughly 4 mm/yr. The Whitter portion of the fault, which is closest to the project site, has been assigned a maximum magnitude of 7.2 and a slip rate between 2.5 and 3.0 mm/yr. The Whitter Fault is a right-lateral strike-slip fault which has experienced recent Holocene surface rupture.

Sierra Madre Fault

The Sierra Madre fault system consists of a discontinuous zone of four individual fault sections that trend along the southern base of the San Gabriel Mountains for a total distance of approximately 39 miles. The two sections of the Sierra Madre fault located closest to the subject site contain fault strands which, based on the occurrence of offset Holocene deposits, have been included within Alquist-Priolo Earthquake hazard zones. The remaining two sections of the Sierra Madre fault to the east of the subject site have been designated as potentially active based on the lack of distinct evidence for Holocene displacement. The fault lies at a distance of approximately 7.4 kilometers to the north of the project site at its closest approach. A maximum earthquake magnitude of 7.0 and slip rate of less than 1 mm/yr has been assigned to the fault.

Puente Hills (Santa Fe Springs) Fault

The Puente Hills Fault (Shaw, 1999) is a north dipping blind thrust extending from the Santa Fe anticline northward to the Montebello anticline. The fault has been partitioned into three, north dipping ramp segments, the Los Angeles, Santa Fe Springs, and Coyote Hills [Shaw et. al, 2002]. Movement on the Santa Fe Springs segment is responsible for the 1987 Whittier Narrows earthquake. Research on the earthquake and its aftershocks, as well as fault plane reflections, have resulted in the conclusions that the fault is located between 3 and 7 kilometers below sea level. An estimated earthquake magnitude is 6.5 to 6.6, a slip rate of 0.62 mm/yr. and a recurrence interval of 400 to 1320 years. [Shaw et. al, 2002].

Elysian Park Blind Thrust

The Elysian Park Blind Thrust or Structural Zone underlies the Elysian Park Hills at 3 km and deepens northward to 10 km of depth. The fault has been placed into an active category and has been tentatively mapped to underlie a major portion of the eastern Los Angeles Basin and adjacent San Gabriel Valley to the north. The Elysian Park Thrust has a length of 34 km, slip rate of 1.50 mm/year and is capable of generating a maximum earthquake of M6.7 (Shaw and Suppe, 1996).

Raymond Fault

The Raymond Fault projects roughly east-west from the San Gabriel Mountains to at least the Arroyo Seco in South Pasadena. The fault has a length of about 15 miles. This north dipping thrust fault lies 9.1 kilometers to the north of the subject site. A well-developed linear scarp up to 100 feet high clearly defines the feature. Fault investigations indicate the fault has moved at least once in the last 10,000 years (Holocene Time) placing it into an active category. Minor earthquakes have occurred within the Raymond Basin to the north and in 1991 a moderate sized event (M5.8) occurred beneath Pasadena presumably on the Raymond Fault though no surface rupture was reported. The Raymond Fault has been assigned a maximum magnitude of 6.5 and a slip rate of 0.5 mm/yr.

SEISMIC EXPOSURE

As is the case with most locations in Southern California, the subject site is located in a region that is characterized by moderate to high seismic activity. The project site and vicinity has experienced strong ground shaking due to earthquakes in historic time. The locations of earthquake epicenters with respect to the subject site are shown graphically on Figure D-4, Regional Seismicity.

SECONDARY SEISMIC EFFECTS

General

Secondary effects of seismic activity normally considered as possible hazards to a particular site include several types of ground failure as well as induced flooding. Various types of ground failures, which might occur as a consequence of severe ground shaking of a site, include landsliding, ground subsidence, ground lurching, shallow ground rupture and liquefaction. The probability of occurrence of each type of ground failure depends on the severity of the earthquake, distance from faults, topography, subsoils and groundwater conditions, in addition to other factors. Based on a review of available published literature, landsliding, ground subsidence, ground lurching and shallow ground ruptures are considered unlikely at the site.

Various types of seismically induced flooding, which may be considered as potential hazards to a particular site, include flooding due to a tsunami (seismic sea wave), a seiche, or failure of a major water retention structure upstream of the project. Since the site is located approximately 30 miles inland from the Pacific Ocean at an elevation of greater than approximately +311 feet above mean sea level, the probability of flooding due to a tsunami is considered to be nonexistent. The site is located approximately 7.5 kilometers downstream from the Santa Fe Dam and 14.4 kilometers downstream from the Puddingstone Reservoir. As shown on the City of Puente Hills Community Safety Element (La Puente, 2004), the site is located outside the potential inundation of the Santa Fe Dam failure but with the potential inundation by failure of the Puddingstone Reservoir. In the unlikely event of catastrophic failure or breach of the Puddingstone Reservoir, floodwaters would extend to the site within two to three hours. The area of inundation due to dam failure with respect to the subject site are shown graphically on Figure D-5, Dam Flood Inundation.

The project site is not located within a 100- or 500-year flood zone as designated by the Federal Emergency Management Agency. The City of Puente Hills Community Safety Element (La Puente, 2004) indicates that the regional drainage infrastructure adequately protects the City from flooding associated with storm events.

Liquefaction Considerations

Loosely compacted/deposited granular soils located below the water table can fail through the process of liquefaction during strong earthquake-induced ground shaking. In this process, there is a rapid decrease in shearing resistance of cohesionless soils, caused by a temporary increase in the pore water pressure. Factors known to influence liquefaction potential include soil type and depth, grain size, relative density, ground-water level, degree of saturation, and both intensity and duration of ground shaking.

As a result of liquefaction, a typical building structure may be exposed to several hazards, including liquefaction-induced settlement, foundation bearing failure, and lateral displacement or lateral spreading. The surface manifestation of liquefaction in deeper soil deposits often takes place in the form of sand boils and ground subsidence. Such phenomena often lead to loss of adequate support for building foundations (bearing failures) and cause tilting, excessive movement and cracking of superstructures. The severity of ground subsidence depends largely on the relative thickness of the surficial non-liquefiable layer compared to the thickness of layers undergoing liquefaction.

According to the published State Seismic Hazard Zones map for the Baldwin Park Quadrangle, the site is located in an area designated by the State Geologist as a "zone of required investigation" due to the potential for earthquake-induced liquefaction. Details of the liquefaction zones in the vicinity of the site are shown on Figure D-6, Seismic Hazards Zones Map. Based on our evaluation of the potential for liquefaction, layers of silty sand and sandy silt between depths of approximately 15 to 20 feet and 28 to 32 feet exhibit a potential for liquefaction during a design earthquake. However, it is unlikely that current groundwater levels (greater than 100 feet deep) will rise to these potentially liquefiable soils layers as required for liquefaction during a seismic event. For details and results on our liquefaction and seismic settlement evaluation, refer to Sections 4.2.4 in the text of our report.

SUMMARY OF GEOLOGIC CONDITIONS

Based on the results of our geotechnical investigation and a review of the information provided in the referenced literature, it is recommended that the following geologic conditions be taken into account during the seismic assessment of the proposed development.

- The subject site is located in a seismically active area of southern California. The type and magnitude of seismic hazards that may affect the site are dependent on both the distance to causative faults and the intensity and duration of the seismic event. The subject site will likely experience strong ground shaking caused by earthquakes on active, regional faults in the future. The evaluation of the seismic impact to the proposed development should be performed in accordance with the seismic design parameters provided in the building code and our final geotechnical investigation report.

- Active faults have not been mapped projecting through the site.

- The site is located in an area designated by the State Geologist as a “zone of required investigation” for liquefaction hazard. Our analysis indicates that there is a potential for liquefaction of soil layers at depth shallower than approximately 32 feet in the unlikely event that current groundwater at depths greater than 100 feet rises to that level. Details of our liquefaction and seismic settlement evaluation are presented in Section 4.2.4 of the report.

- The site is located an area subject to potential inundation as designated by the City in the event of a failure of the Puddingstone Reservoir.

- Based on a review of available published literature, landsliding, ground subsidence, ground lurching and shallow ground ruptures are considered unlikely at the site.

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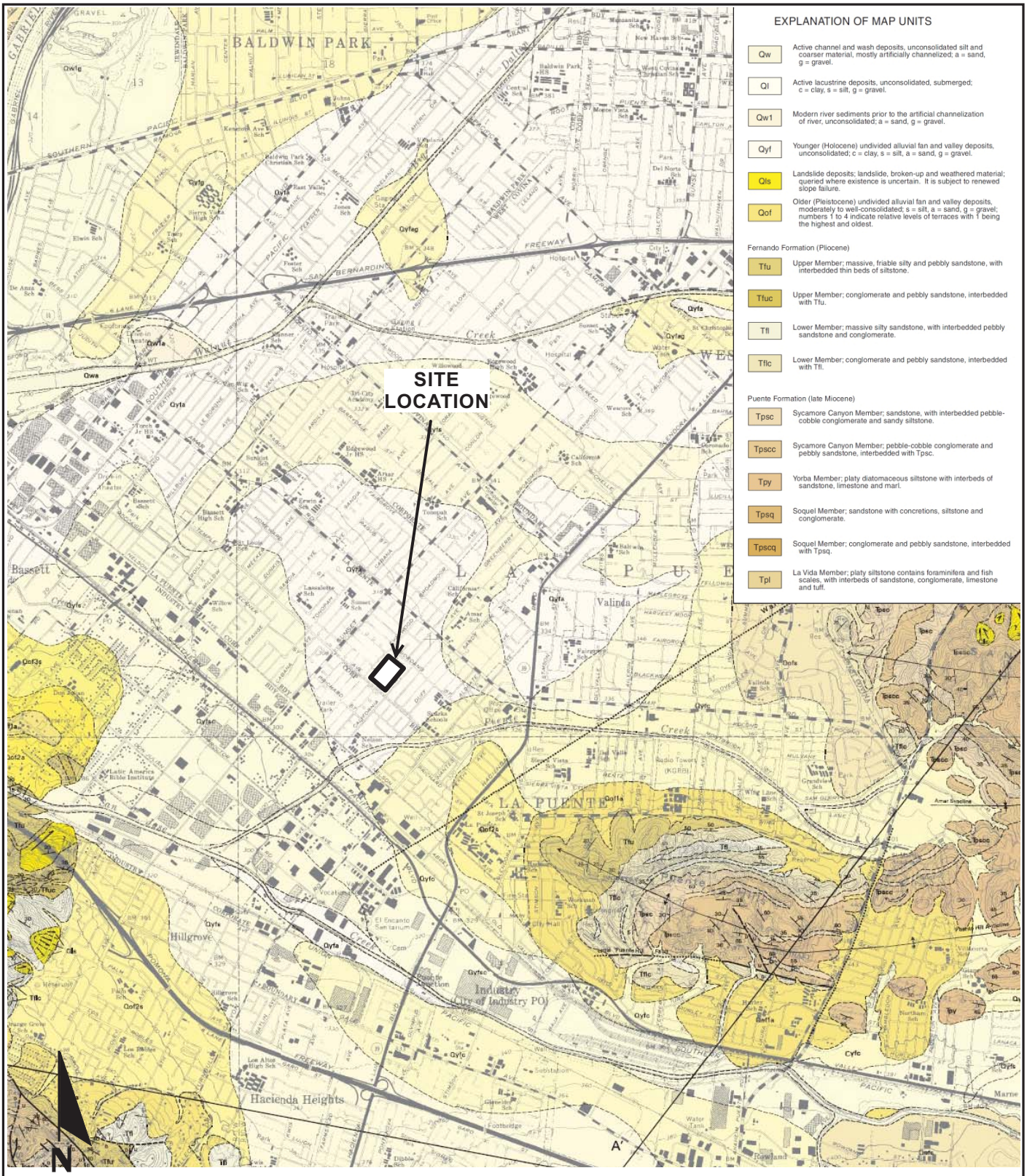


BASE MAP REPRODUCED FROM THE GEOLOGIC MAP OF BALDWIN PARK 7.5' QUADRANBLE PROVIDED BY USGS DATED 1997

0 4000 8000 FEET

GPI GEOTECHNICAL PROFESSIONALS, INC.

PERFORMANCE ARTS CENTER

GPI PROJECT NO.: 3097.I | SCALE: 1" = 4000'

REGIONAL GEOLOGIC MAP

FIGURE D-1.1

EXPLANATION

B-1 APPROXIMATE LOCATION OF EXPLORATORY BORING

C-4 APPROXIMATE LOCATION OF CONE PENETRATION TEST

APPROXIMATE FOOTPRINT OF PROPOSED BUILDING

Qya YOUNGER ALLUVIAL DEPOSITS

APPROXIMATE LOCATION OF GEOLOGIC CROSS SECTION (FIGURE 4)

N

0 100 200 FEET

BASE PLAN REPRODUCED FROM GOOGLE EARTH © 2021

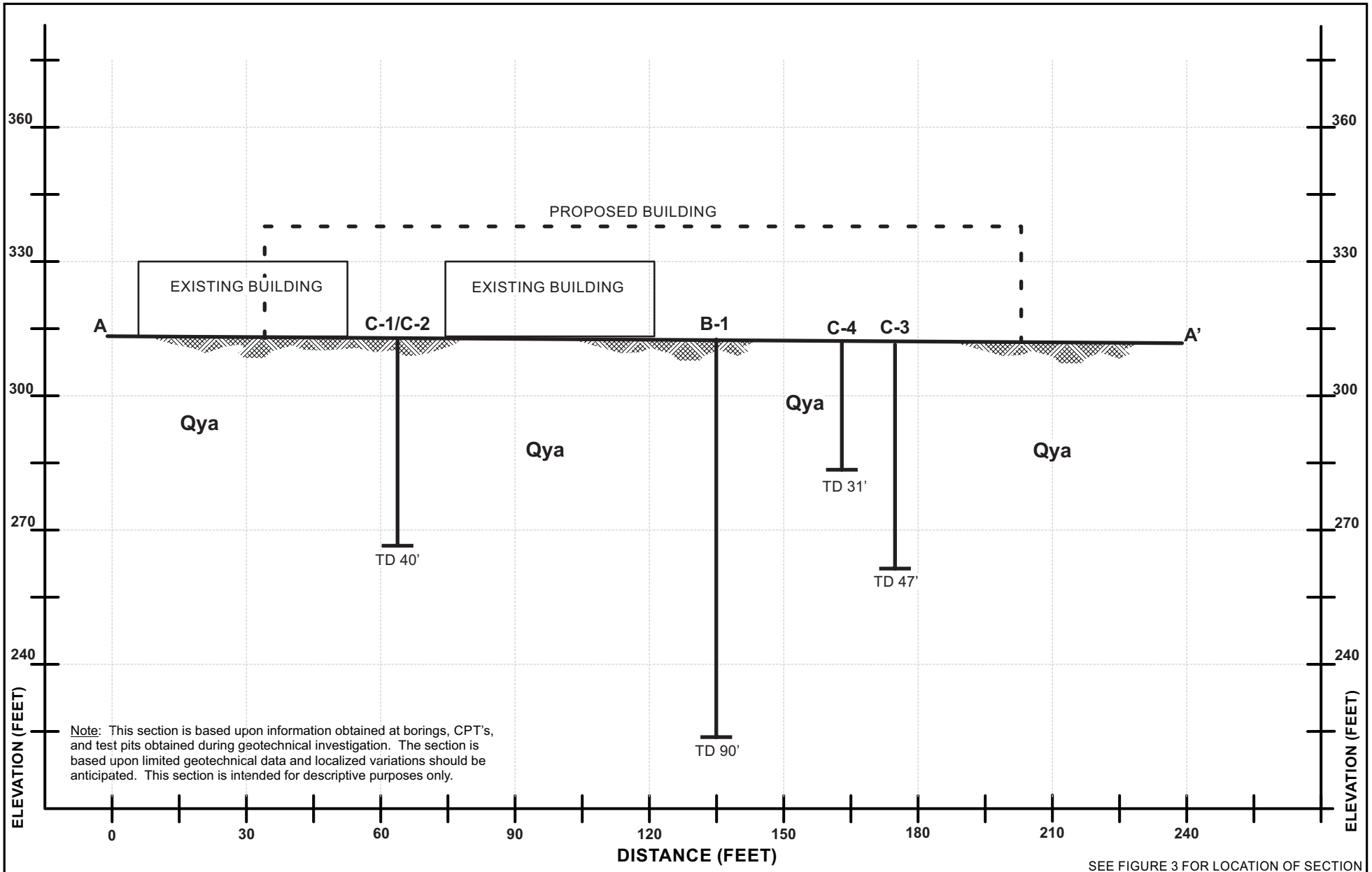
GPI GEOTECHNICAL PROFESSIONALS, INC.

PERFORMANCE ARTS CENTER

GPI PROJECT NO.: 3097.I | SCALE: 1" = 100'

SITE GEOLOGIC MAP

FIGURE D-1.2



SEE FIGURE 3 FOR LOCATION OF SECTION

SOIL UNITS

Qya YOUNGER ALLUVIUM DEPOSITS

GEOTECHNICAL PROFESSIONALS, INC.

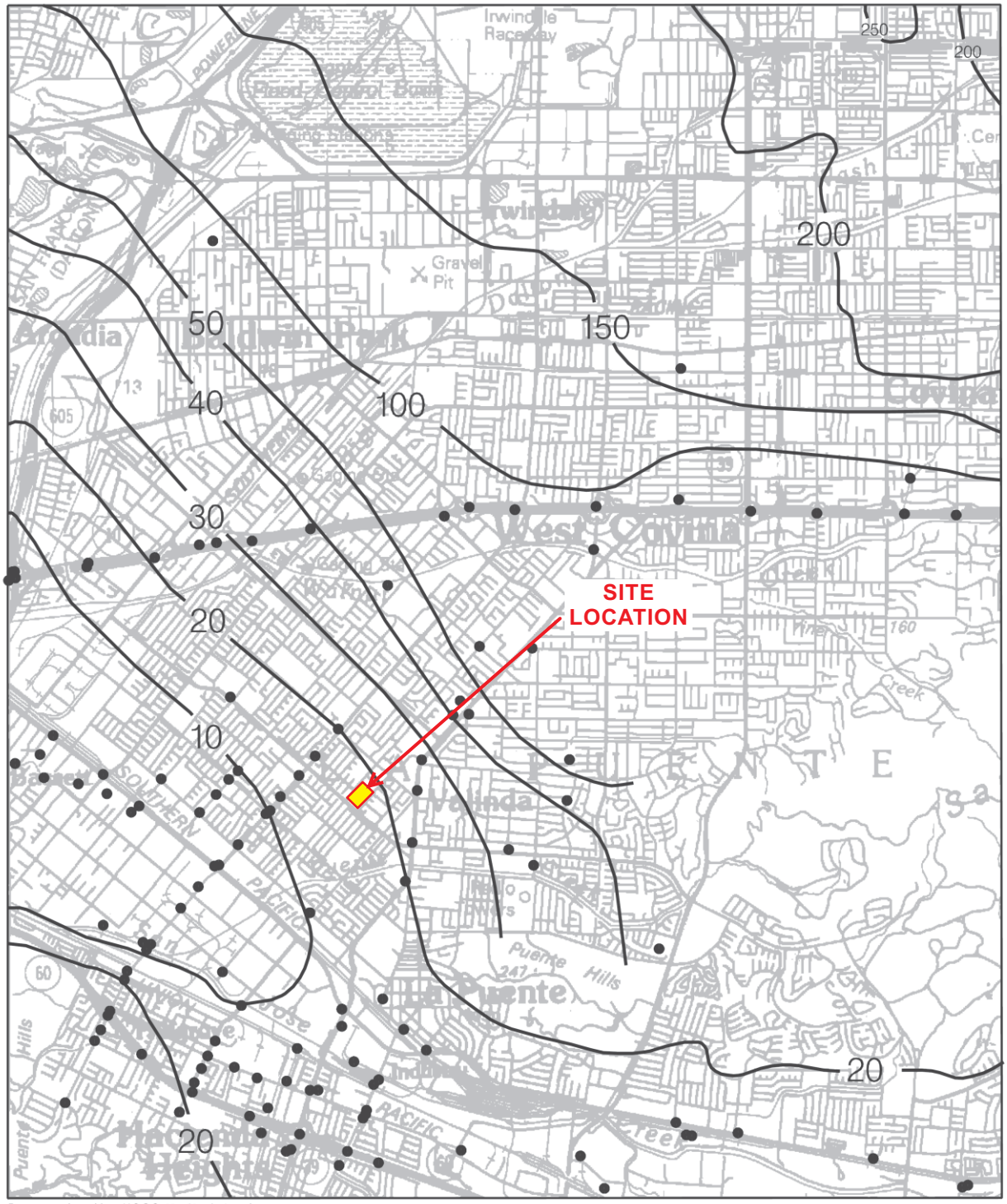
PERFORMANCE ARTS CENTER

GPI PROJECT NO.: 3097.I

SCALE: 1" = 30'

SUBSURFACE SECTION (A-A')

FIGURE D-1.3



BASE MAP REPRODUCED FROM HISTORICAL GROUNDWATER MAP
(PLATE 1.2) FROM SEISMIC HAZARD ZONE REPORT 013 (1998)

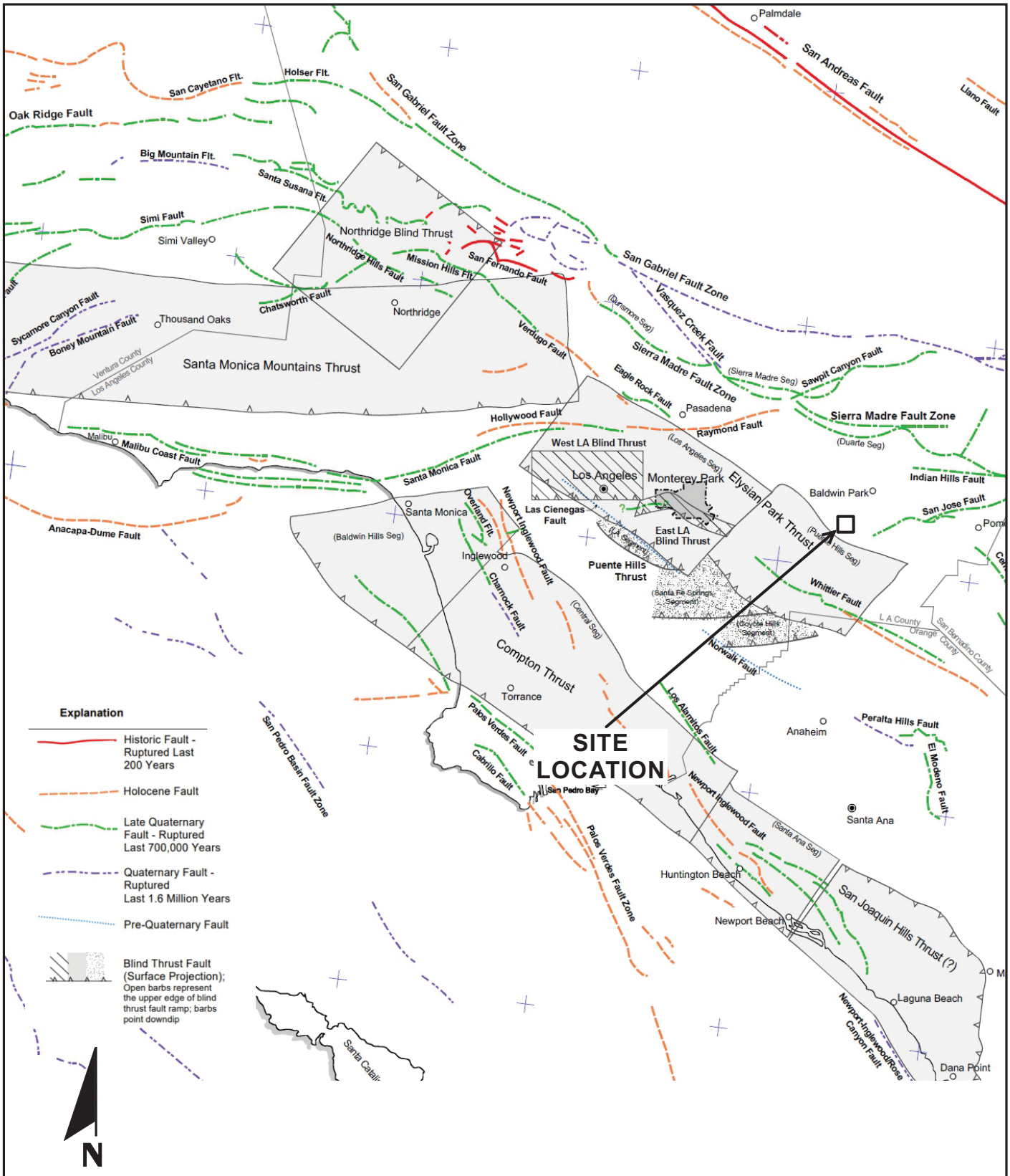
GEOTECHNICAL PROFESSIONALS, INC.

PERFORMANCE ARTS CENTER

GPI PROJECT NO. 3097.I | SCALE: 1" = 6000'

HISTORIC GROUNDWATER MAP

FIGURE D-2



REGIONAL FAULT MAP REPRODUCED FROM EARTHQUAKE FAULTS PLAN FROM MONTEREY PARK GENERAL PLAN BY BING YEN & ASSOCIATES, INC.: DATED JULY 2001

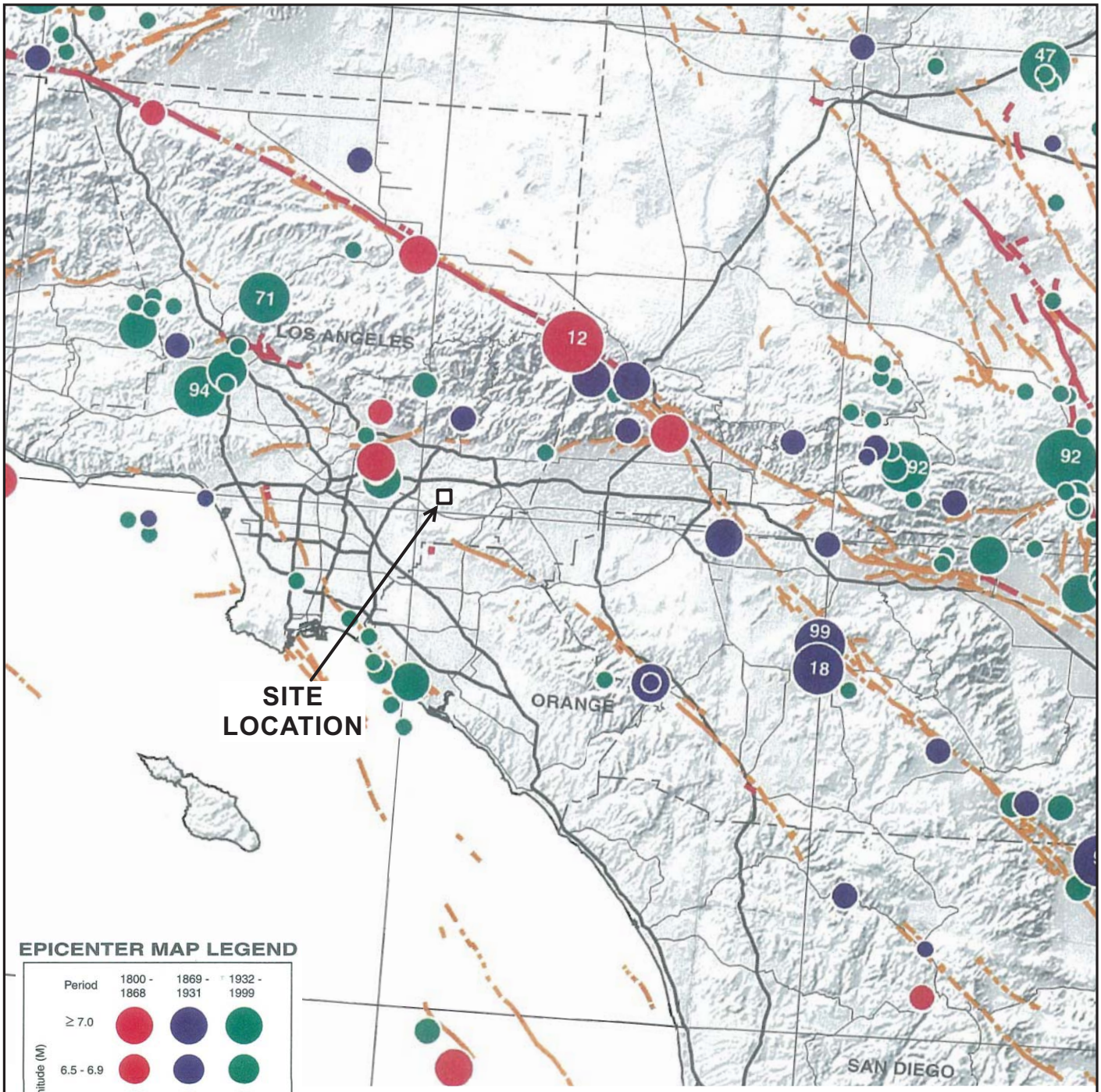
GPI GEOTECHNICAL PROFESSIONALS, INC.

PERFORMANCE ARTS CENTER

GPI PROJECT NO. 3097.I | SCALE: 1" = 10 MILES

REGIONAL FAULT MAP

FIGURE D-3



REGIONAL FAULT MAP REPRODUCED FROM EARTHQUAKE FAULTS PLAN FROM MONTEREY PARK GENERAL PLAN BY BING YEN & ASSOCIATES, INC.: DATED JULY 2001

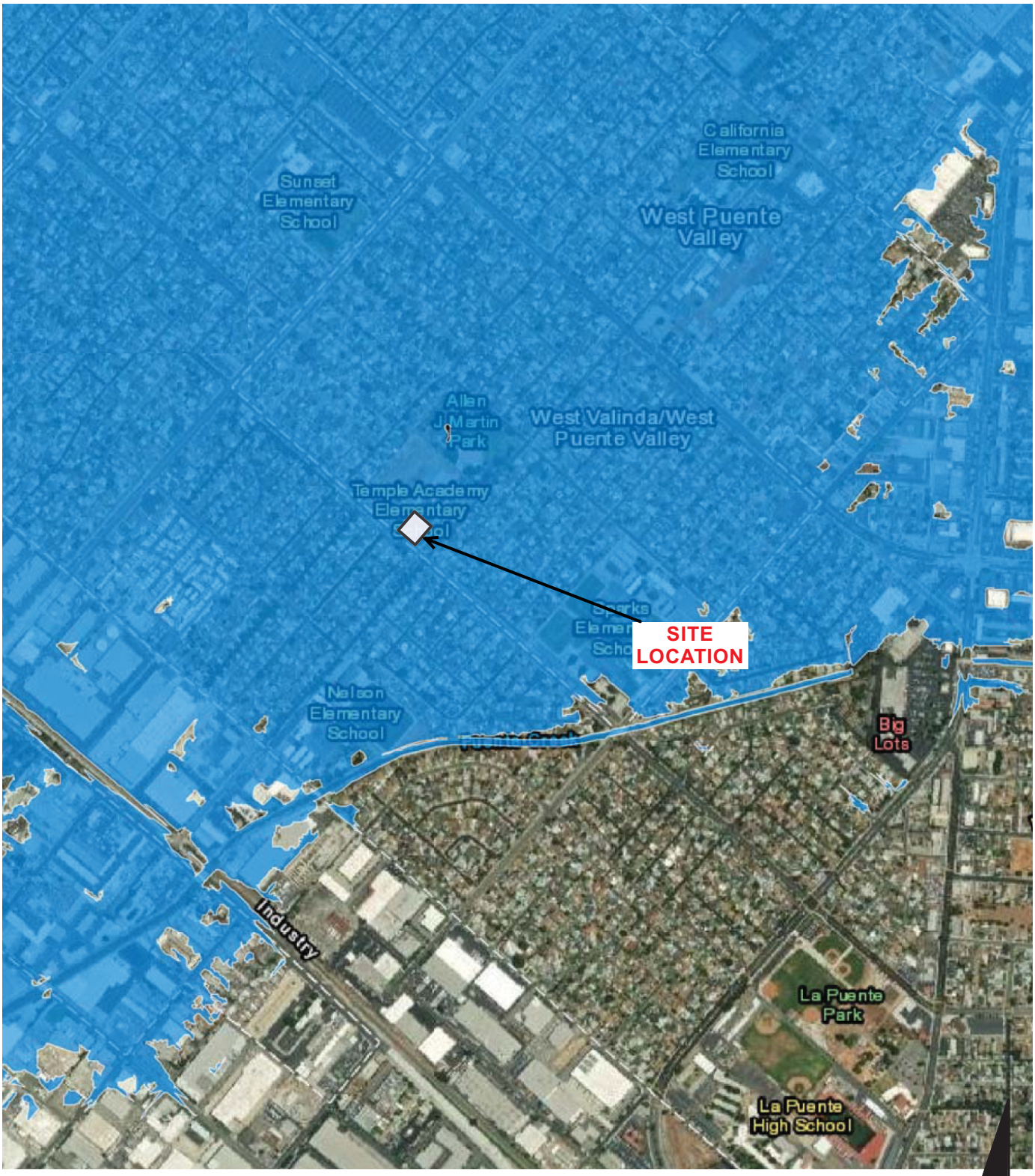
GEOTECHNICAL PROFESSIONALS, INC.

PERFORMANCE ARTS CENTER

GPI PROJECT NO.: 3097.I | SCALE: 1" = 20 MILES

REGIONAL SEISMICITY

FIGURE D-4



0 2250 4500 FEET

BASE MAP REPRODUCED FROM PUDDINGSTONE RESERVOIR FLOOD PLAN PROVIDED BY CALIFORNIA DEPARTMENT OF WATER RESOURCES © 2021
(1https://fmds.water.ca.gov/maps/damim/)

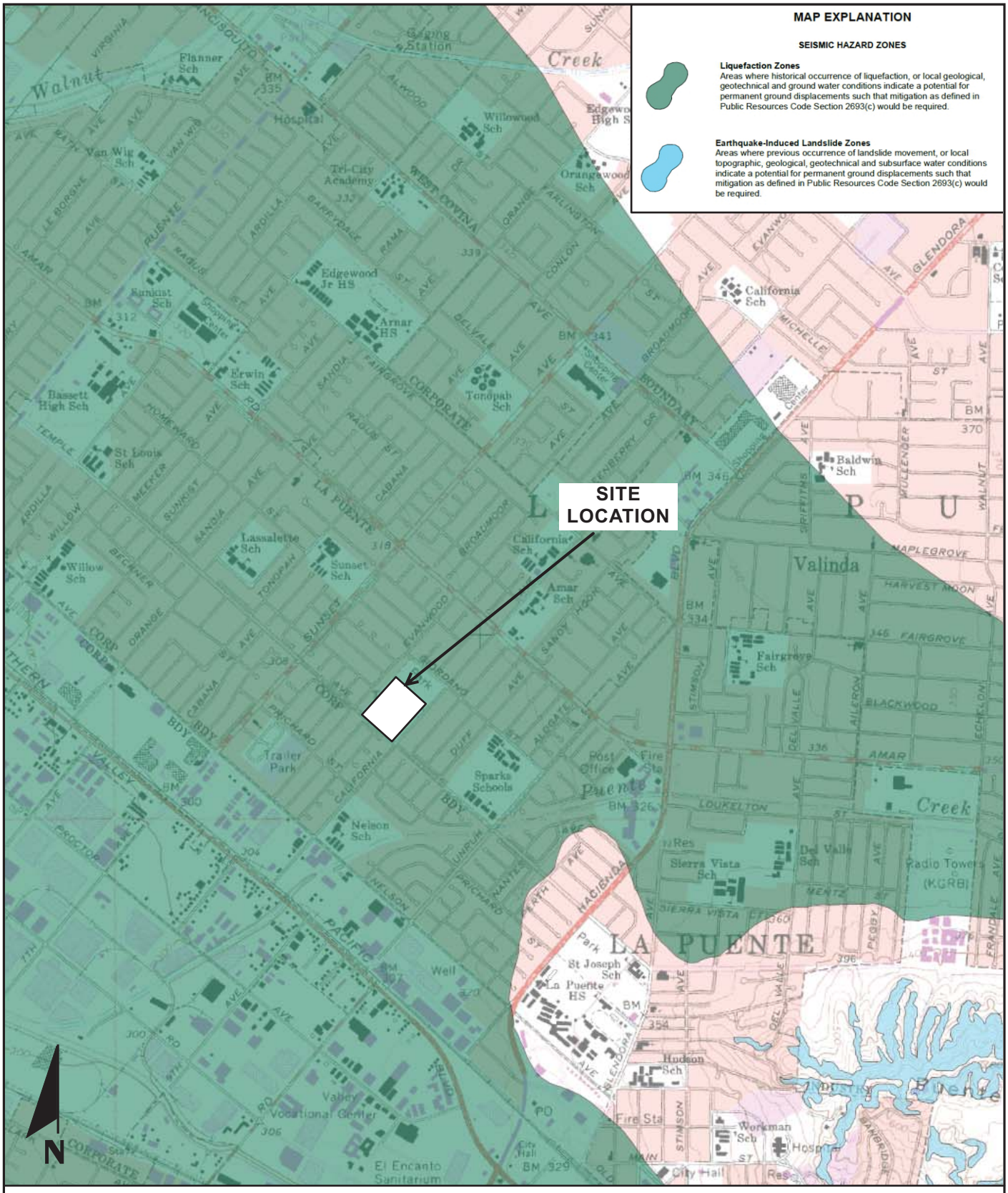
GPI GEOTECHNICAL PROFESSIONALS, INC.

PERFORMANCE ARTS CENTER

GPI PROJECT NO. 3097.I | SCALE: 1" = 2250'

PUDDINGSTONE RESERVOIR INUNDATION

FIGURE D-5



BASE MAP REPRODUCED FROM THE SEISMIC HAZARDS ZONE MAP FOR THE BALDWIN PARK QUADRANGLE PREPARED BY THE CALIFORNIA GEOLOGIC SURVEY: RELEASED MARCH 25, 1999

GPI GEOTECHNICAL PROFESSIONALS, INC.

PERFORMANCE ARTS CENTER

GPI PROJECT NO. 3097.I | SCALE: 1" = 2000'

SEISMIC HAZARDS LIQUEFACTION

FIGURE D-6

APPENDIX E

APPENDIX E

SITE-SPECIFIC RESPONSE SPECTRA

Site specific response spectra were generated in accordance with the 2019 California Building Code (CBC) (Section 1613A) and Section 21.2 of ASCE 7-16 (ASCE, 2017), as well as ASCE 7-16 Supplement 1 (2018). Creation of a site-specific response spectrum requires analyzing site-specific deterministic and probabilistic seismic response spectra in order to create the Risk-Targeted Maximum Considered Earthquake (MCE_R) and Design response spectra.

We calculated the deterministic and probabilistic site-response spectra using web-based tools that estimate uniform hazard spectra using faults as earthquake sources. The web tools include geographic and seismic information on known active faults in California based on the 2014 USGS fault model. For both our deterministic and probabilistic analyses, we used four 2014 NGA West 2 attenuation relationships to determine the geometric-mean horizontal component of ground motion: Abrahamson-Silva-Kamai (2014), Boore-Stewart-Seyhan-Atkinson (2014), Campbell-Bozorgnia (2014), and Chiou-Youngs (2014).

For our evaluations, we used a shear wave velocity, V_{S30}, of 205 meters per second (m/s), or about 675 feet per second (fps), for the selected attenuation relationships. This value corresponds to the lower range of the CBC Site Class D (stiff soil) and was correlated using SPT blowcounts.

Probabilistic Spectra

The probabilistic (MCE_R) ground motion spectra (per the Method 1 requirements of Section 21.2.1.1, ASCE 7-16) were calculated using the USGS Unified Hazard Tool website. Using inputs of the site coordinates, Site Class, and time horizon (return period), the web tool outputs the Uniform Hazard Response Spectrum (UHRS) for predetermined Site Classes and shear wave velocities. For our analysis, we utilized the *Dynamic: Conterminous U.S. 2014 (update, v4.2.0)* edition of the web tool. We calculated response spectra for 259 m/s (Site Class D) and 180 m/s (D/E Boundary) and then linearly interpolated between those spectra based on our estimated site-specific shear wave velocity of 205 m/s.

The MCE_R corresponds to an earthquake ground motion having a 2 percent probability of exceedance within a 50-year period, or an average return period of 2,475 years. The final probabilistic response spectrum was based on the geometric mean horizontal component, scaled by factors to convert the geometric-mean response to the maximum-rotated response, of the spectral response values at 5% damping for the four above noted attenuation relationships. The maximum rotated component (MRC) response factors used were based on the period dependent factors developed by Huang, Whittaker, and Luco (2008) and presented in Section 21.2 of ASCE 7-16. The weighted average, maximum-rotated site-specific probabilistic response for the above predetermined shear wave velocities, as well as the final interpolation based on the site-specific shear wave velocity, are shown on Figure E-1 (see attached).

Deterministic Spectra

Site-specific deterministic MCE response spectra were generated per the requirements of ASCE Section 7-16. The response spectrum was generated for nearby active faults, which were determined based on a combination of proximity and the table of deaggregation contributors developed with the USGS Unified Hazard Tool. Based on the above resources, the controlling deterministic response spectrum is predominantly based on the Whittier Fault, with the Puente Hills fault controlling at periods greater than or equal to approximately 3 to 5 seconds.

Spectral acceleration ordinates were calculated utilizing the Pacific Earthquake Engineering Research Center (PEER) ground motion database and the PEER NGA-West2 Spectrum model. We utilized the four previously noted attenuation relationships (equally weighted) and determined the required input fault parameters from USGS web resources (see references). Per the requirements of ASCE 7-16, we utilized an epsilon value of 1.0 for our analysis, which corresponds to the 84^{th} percentile of the geometric-mean component (S_a + one standard deviation) of the spectral acceleration at 5% damping. As with the probabilistic spectrum, the geometric-mean values were scaled by period-dependent factors per Huang et al (2008) to obtain the maximum-rotated response. The site-specific deterministic response spectrum is shown on Figure E-2.

MCE_R and Design Response Spectra

The above-described analytical steps are presented in the attached Table E-1, Risk-Targeted Site-Specific Seismic Response Spectra Worksheet.

The site-specific MCE_R response spectrum was generated per the requirements of Section 21.2 of ASCE 7-16 by comparing the spectral response accelerations from the probabilistic MCE_R (Section 21.2.1, see Figure 1) and the deterministic MCE_R (Section 21.2.2, see Figure 2), with the resulting MCE_R response spectrum being the lesser of the spectra accelerations at each period. The ordinates for the MCE_R response spectrum are presented in Table E-1 (Column 11).

The site-specific design response spectrum was generated per the requirements by taking 2/3 of the risk-targeted MCE_R response spectrum, but confirming that the values are not less than 80 percent of the spectral acceleration determined per Sections 11.4.6 and 21.3 of ASCE 7-16. The ordinates for the site-specific design response spectrum are presented in Table E-1 (Column 12).

The risk-targeted site-specific MCE_R and design response spectra, as well as the mapped CBC response spectrum, are shown on Figure E-3 and tabulated in Table E-1.

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TABLE 1
RISK TARGETED SITE-SPECIFIC SEISMIC REPONSE WORKSHEET

Project	**Performing Arts Center**
Proj. No.	**3097.I**
Latitude	**34.038146**
Longitude	**-117.963**

Site Class	**D**
T_o	0.122 sec
T_s	0.612 sec
T_L	8.0 sec
V_S	675 ft/sec

2019 CBC Parameters

S_s	1.725	S_1	0.621
F_a	1.000	F_v*	1.700
S_{MS}	1.725	S_{M1}	1.056
S_{DS}	1.150	S_{D1}	0.704
$0.08\ F_v/F_a$	0.136	$0.4F_v/F_a$	0.680

PGA_M	0.807
C_{RS}	0.909
C_{R1}	0.903

NGA West2 Attentuation Relationships

1) Abrahamson-et al (2014)
2) Boore-et al (2014)
3) Cambell-Bozorgnia (2014)
4) Chiou-Youngs (2014)

SITE-SPECIFIC PARAMETERS

S_{MS}	**1.898**
S_{M1}	**2.168**
S_{DS}	**1.265**
S_{D1}	**1.446**
PGA_M	**0.789**

1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)	12)
Period (sec)	2019 CBC MCE_R Spectrum	2019 CBC Design Response Spectrum	Risk Coefficient C_R	Scaled MCE_R Deterministic Spectrum (if required)	Probabilistic MCE_R Spectrum	Probabilistic w/ Risk Coefficient C_R	84th Percentile Deterministic Spectrum	2/3 Site Specific MCE_R Spectrum	80% of 2019 CBC Design Spectrum	**Site Specific MCE_R Spectrum**	**Design Response Spectrum**
0.000	0.807	0.538	0.909	NA	0.868	0.789	0.937	0.526	0.430	**0.789**	**0.526**
0.050	1.113	0.742	0.909	NA	1.147	1.042	0.950	0.633	0.521	**0.950**	**0.633**
0.100	1.536	1.024	0.909	NA	1.426	1.296	1.270	0.847	0.675	**1.270**	**0.847**
0.122	1.725	1.150	0.909	NA	1.531	1.391	1.360	0.907	0.743	**1.360**	**0.907**
0.200	1.725	1.150	0.909	NA	1.894	1.722	1.673	1.116	0.920	**1.673**	**1.116**
0.300	1.725	1.150	0.908	NA	2.215	2.011	2.089	1.341	0.920	**2.011**	**1.341**
0.400	1.725	1.150	0.908	NA	2.270	2.060	2.338	1.373	0.920	**2.060**	**1.373**
0.500	1.725	1.150	0.907	NA	2.325	2.109	2.412	1.406	0.920	**2.109**	**1.406**
0.600	1.725	1.150	0.906	NA	2.213	2.005	2.346	1.337	0.920	**2.005**	**1.337**
0.612	1.725	1.150	0.906	NA	2.199	1.993	2.338	1.328	0.920	**1.993**	**1.328**
0.700	1.508	1.005	0.905	NA	2.101	1.901	2.280	1.268	0.920	**1.901**	**1.268**
0.750	1.408	0.938	0.905	NA	2.044	1.850	2.246	1.233	0.920	**1.850**	**1.233**
0.800	1.320	0.880	0.905	NA	2.004	1.812	2.206	1.208	0.920	**1.812**	**1.208**
0.900	1.173	0.782	0.904	NA	1.923	1.738	2.124	1.158	0.920	**1.738**	**1.158**
1.000	1.056	0.704	0.903	NA	1.842	1.663	2.043	1.109	0.828	**1.663**	**1.109**
2.000	0.528	0.352	0.903	NA	1.183	1.068	1.390	0.712	0.414	**1.068**	**0.712**
3.000	0.352	0.235	0.903	NA	0.800	0.723	1.033	0.482	0.276	**0.723**	**0.482**
4.000	0.264	0.176	0.903	NA	0.575	0.519	0.768	0.346	0.207	**0.519**	**0.346**
5.000	0.211	0.141	0.903	NA	0.440	0.398	0.599	0.265	0.166	**0.398**	**0.265**

(Based Upon Chapters 11 and 21 of ASCE 7-16; 04-14-2020 DJB)

TABLE 1
RISK TARGETED SITE-SPECIFIC SEISMIC REPONSE WORKSHEET

EXPLANATION: NOTES AND REFERENCES

INPUT BLUE ONLY - RED AND BLACK CALCULATED

Column Descriptions

01) Periods including To and Ts calculated from Section 11.4.6 (ASCE 7-16)

02) OSHPD, Seismic Design Maps Web Application - MCE_R Response Spectrum (seismicmaps.org) and Section 11.4.7 (7-16)

03) OSHPD, Seismic Design Maps Web Application - Design Spectrum (2/3 of Column 2) per Section 11.4.6 (7-16)

04) Risk Coefficient, C_R, for 0.2s and 1.0s periods (ASCE 7-16, Section 21.2.1.1); from OSHPD web application

05) Deterministic Lower Limit on MCE_R if required (ASCE 7-16 Supplement 1; Section 21.2.2)

06) USGS Unified Hazard Tool (UHT), 2% in 50 years Probabilistic Spectrum; scaled w/ MRC factors per Huang et al (2008); per ASCE 7-16, Section 21.2.1.1

07) USGS UHT, Probabilistic MCE_R Spectrum: Product of 2% in 50yr Spectrum and Risk Coefficient (Col. 4 * Col. 6); (ASCE 7-16, Section 21.2.1.1)

08) PEER Ground Motion Database, 84th Percentile Deterministic Spectrum; controlling fault source (ASCE 7-16; Section 21.2.2)

09) Uncorrected Design Response Spectrum (ASCE 7-16 Sec. 21.3), 2/3 * Lesser of Col. 7 & Greater of Cols. 5 & 8 (not less than 80% PGAM per Sec. 21.5.3)

10) 80% of 2019 CBC Design Spectra (Column 3), (ASCE 7-16, Section 21.3) Lower Limit of the Design Spectrum

11) Site-Specific MCE_R (ASCE 7-16, Section 21.2.3); 150% of Design Response Spectrum (Column 12)

12) Final Design Response Spectrum (ASCE 7-16, Section 21.3); Greater of Columns 9 and 10

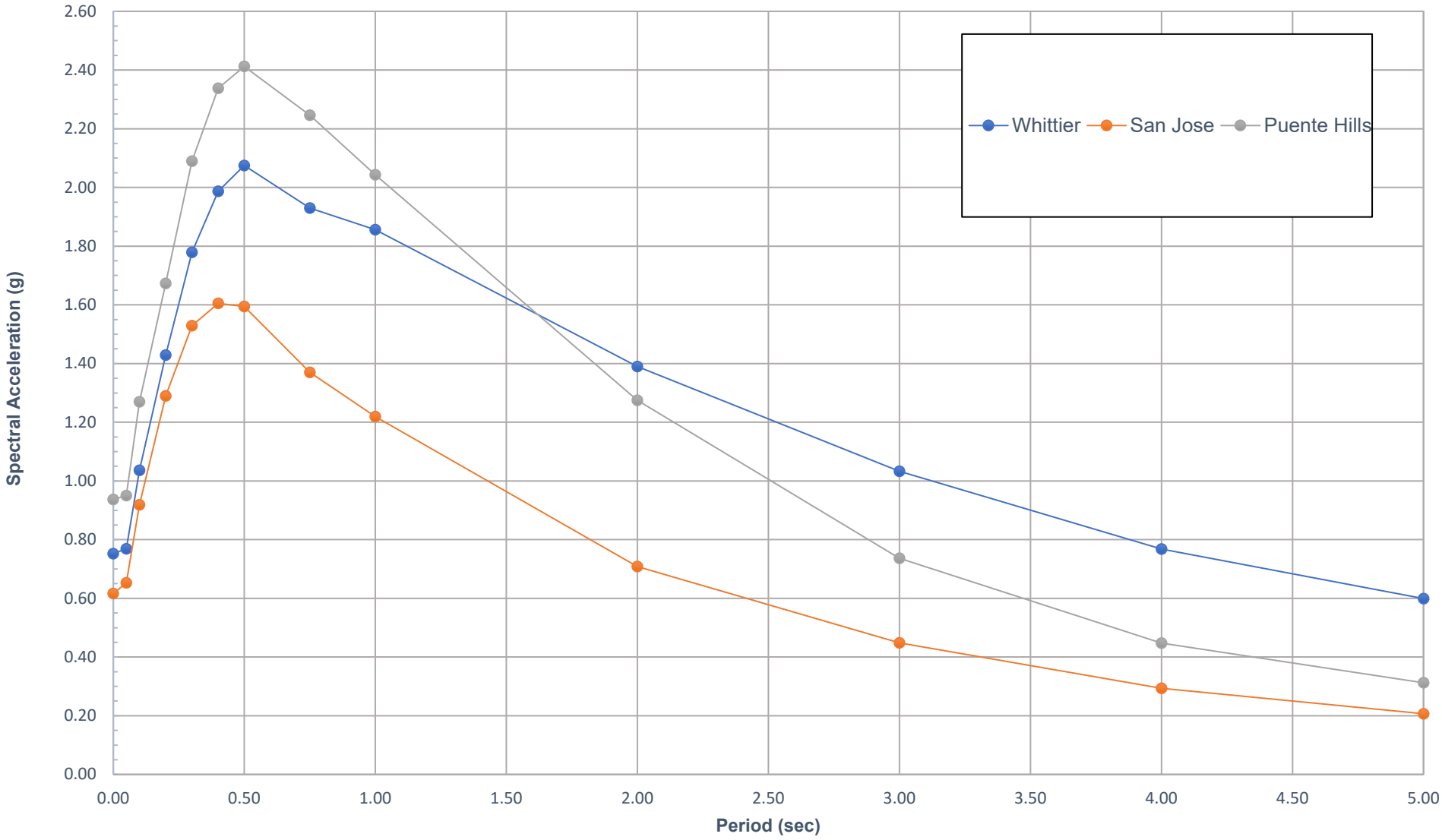
T_L = Figure 22-12 ASCE 7-16 (typically 8 sec Southern California)

MUST CHECK THAT VALUES EXCEED MINIMUMS

Minimum Allowable Value of MCE PGA (Column 9): (80% of PGA_M)	**0.646**
Value of S_{DS}: (Maximum of 90% of Design S_a at any period)	**1.265**
Value of S_{D1}: (Maximum of $T*S_a$ for periods from 1 to 5 seconds)	**1.446**

* = F_V is modified for the deterministic lower limit determinations (Fig. 21.2-1) based on the requirements of Section 11.4.8 and the Site Specific Ground Motion Hazard Analyses as detailed in Section 21.3

(Based Upon Chapters 11 and 21 of ASCE 7-16; 04-14-2020 DJB)

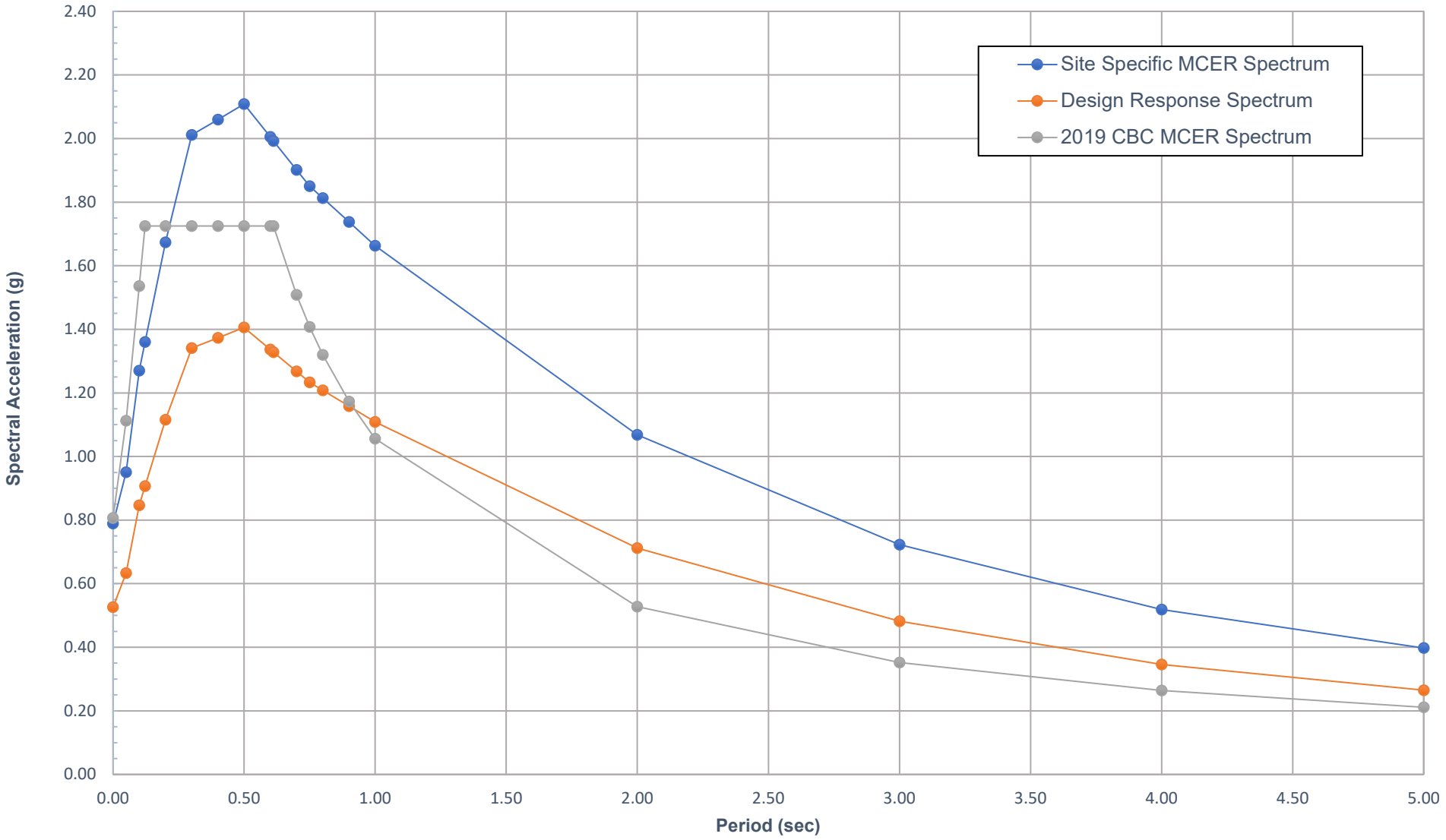


Site-Specific 84th Percentile Deterministic MCE_R Response Spectra
per Chapter 21; ASCE 7-16 (2019 CBC)
Temple Academy Performing Arts Center
La Puente, California

GEOTECHNICAL PROFESSIONALS, INC.

Project No. 3097.I

Figure E-2



Site-Specific MCE_R and Design Response Spectra @ 5% Damping
per Chapter 21; ASCE 7-16 (2019 CBC)
Temple Academy Performing Arts Center
La Puente, California

GEOTECHNICAL PROFESSIONALS, INC.

Project No. 3097.I

Figure E-3

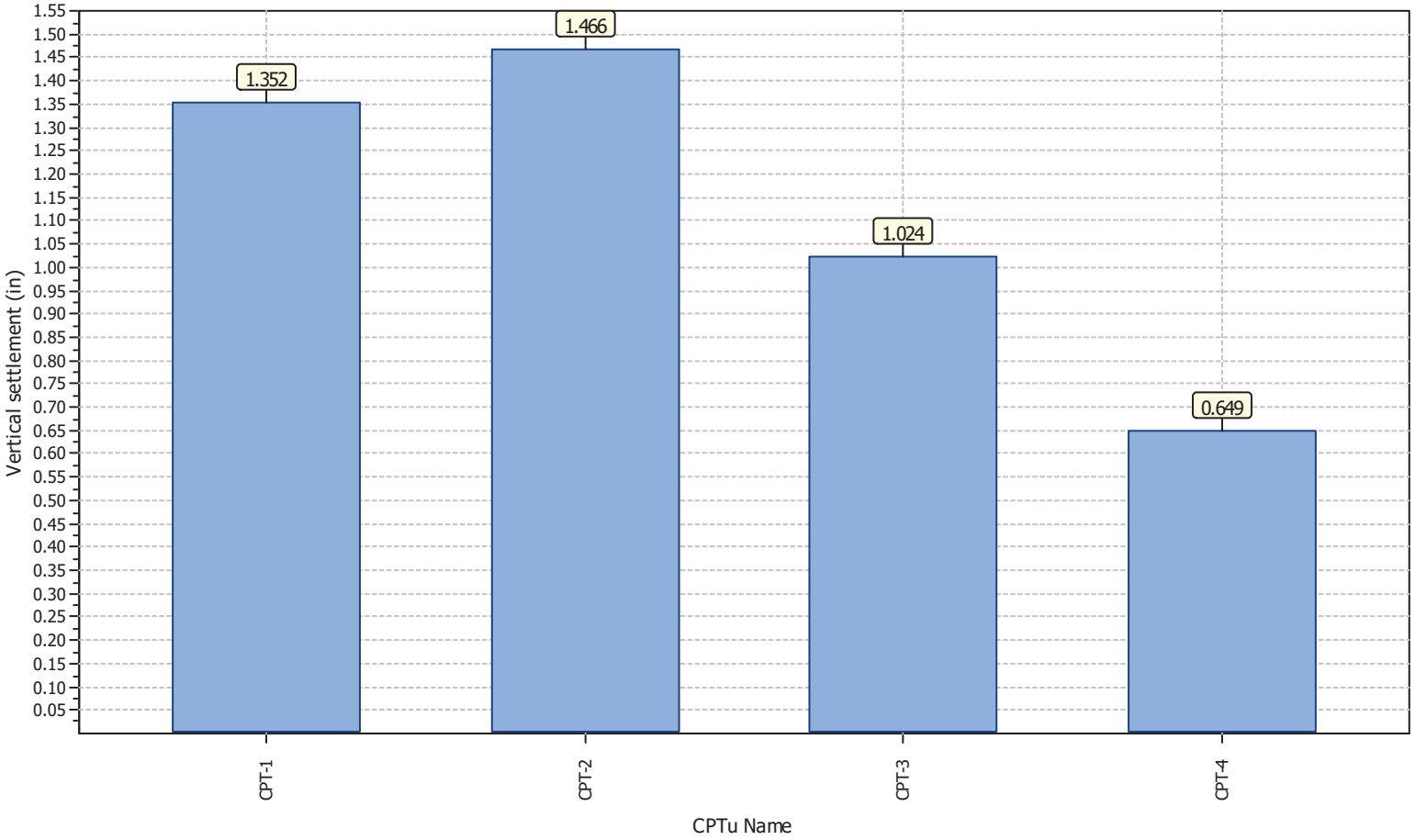
APPENDIX F

GeoLogismiki
Geotechnical Engineers
Merarhias 56
http://www.geologismiki.gr

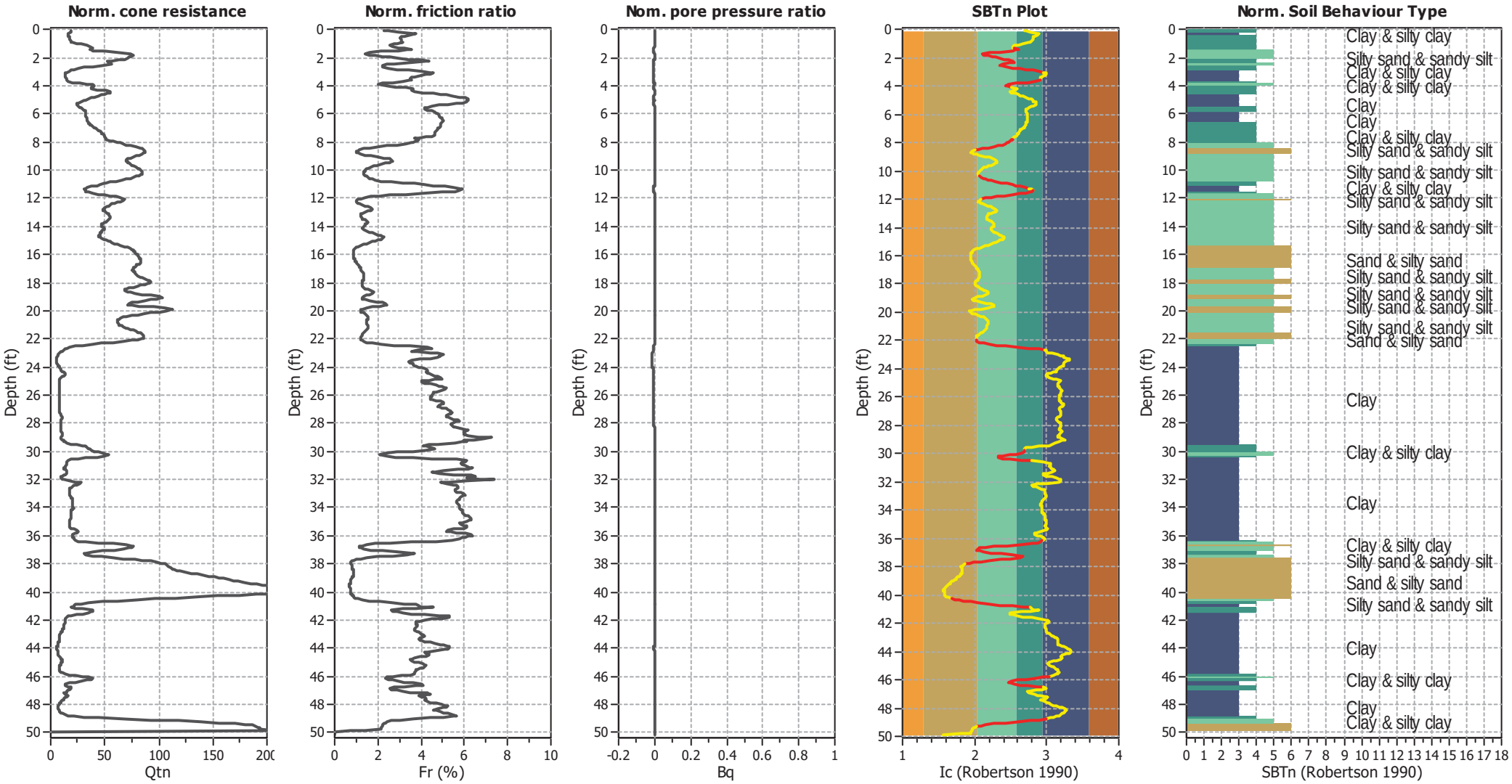
Project title :

Location :

Overall vertical settlements report



CPT basic interpretation plots (normalized)



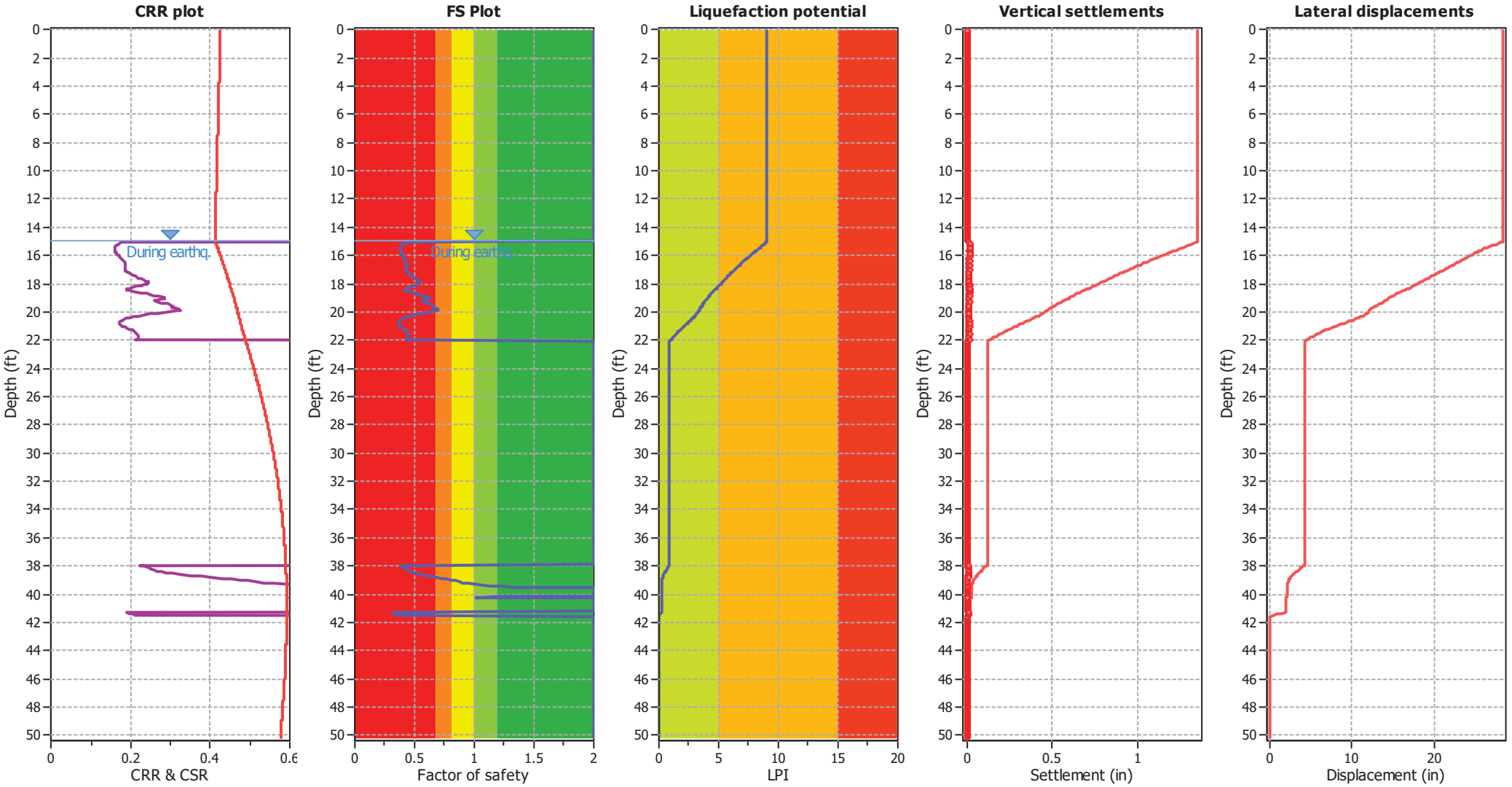
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.81	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.81	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	N/A

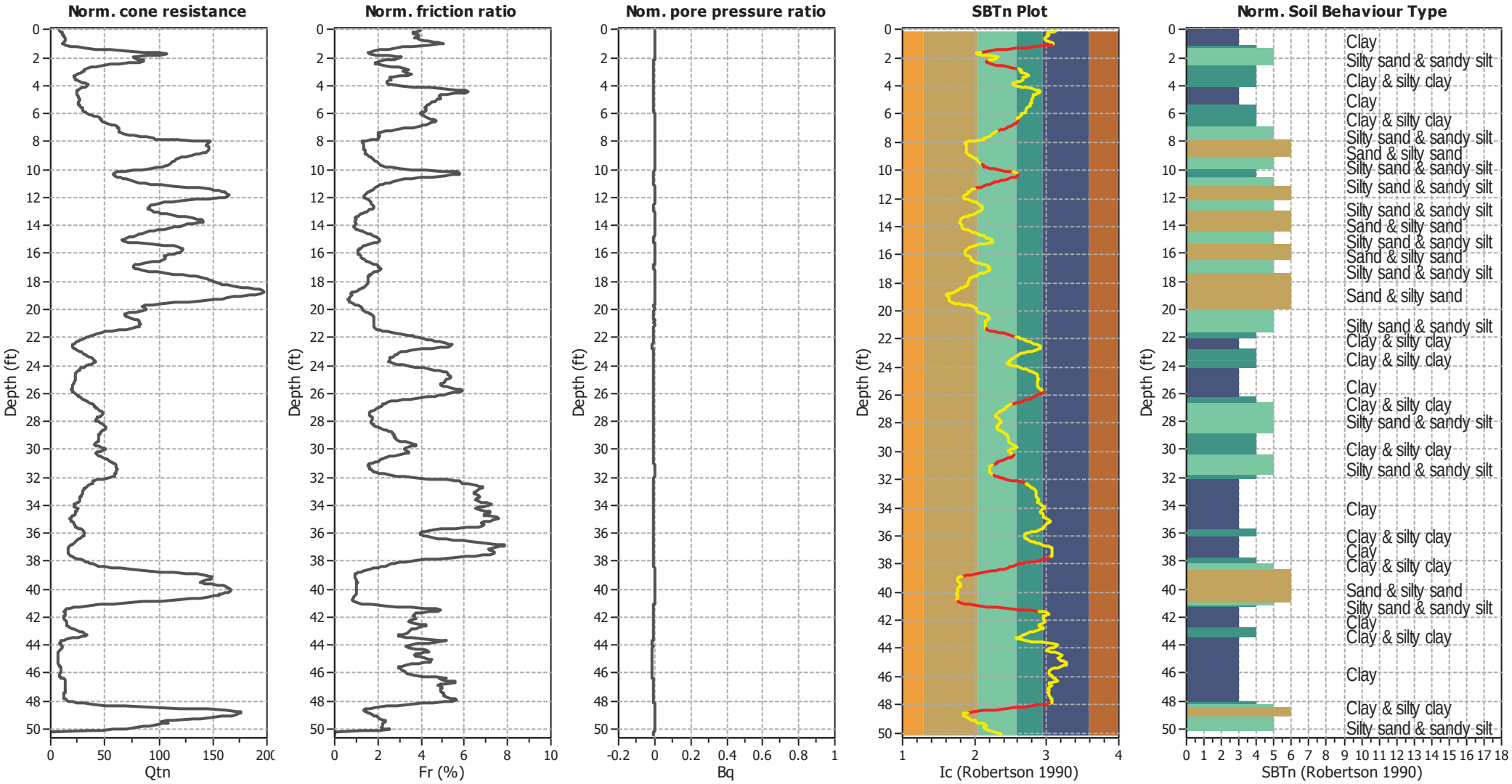
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots (normalized)



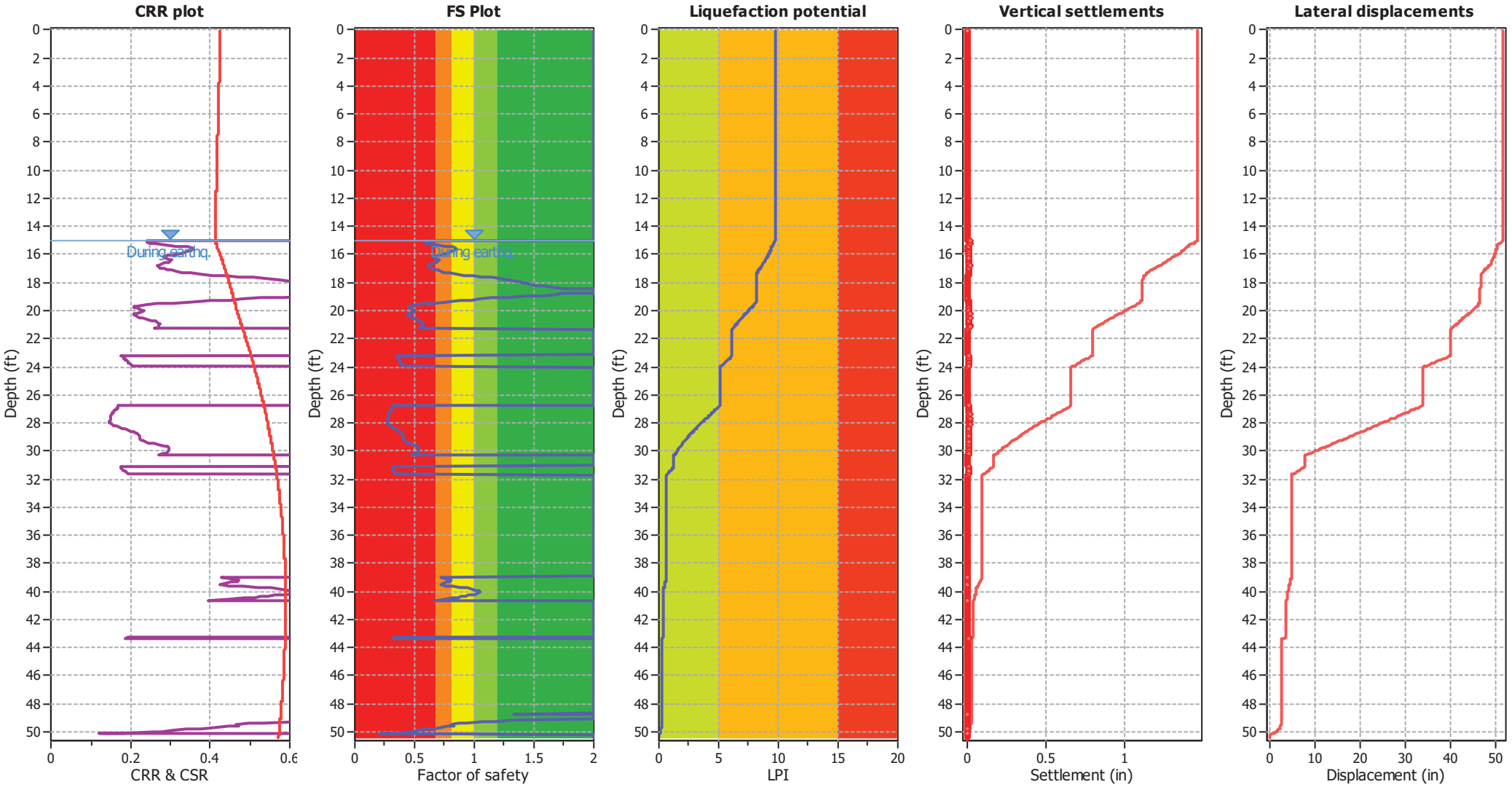
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.81	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.81	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	N/A

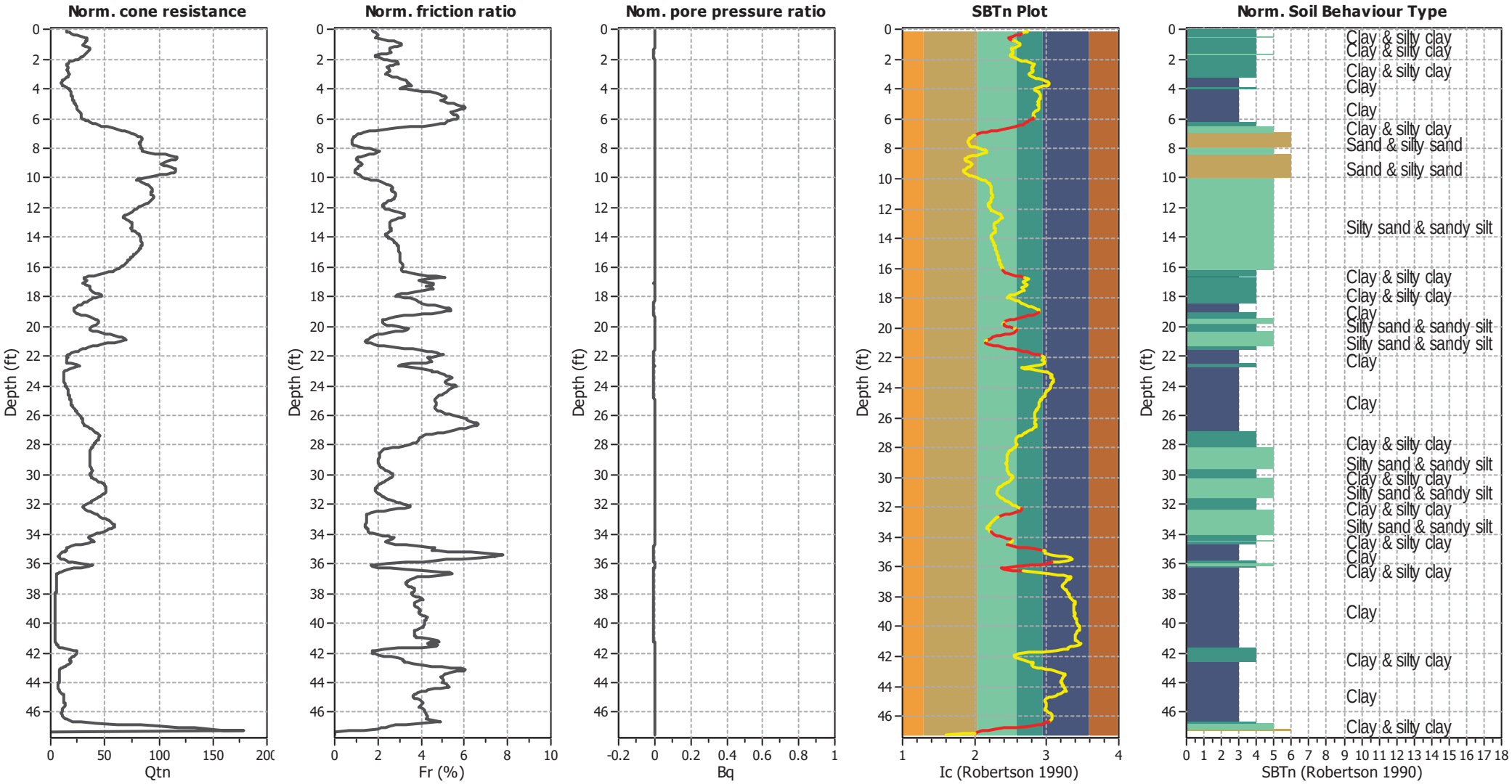
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots (normalized)



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SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
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6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
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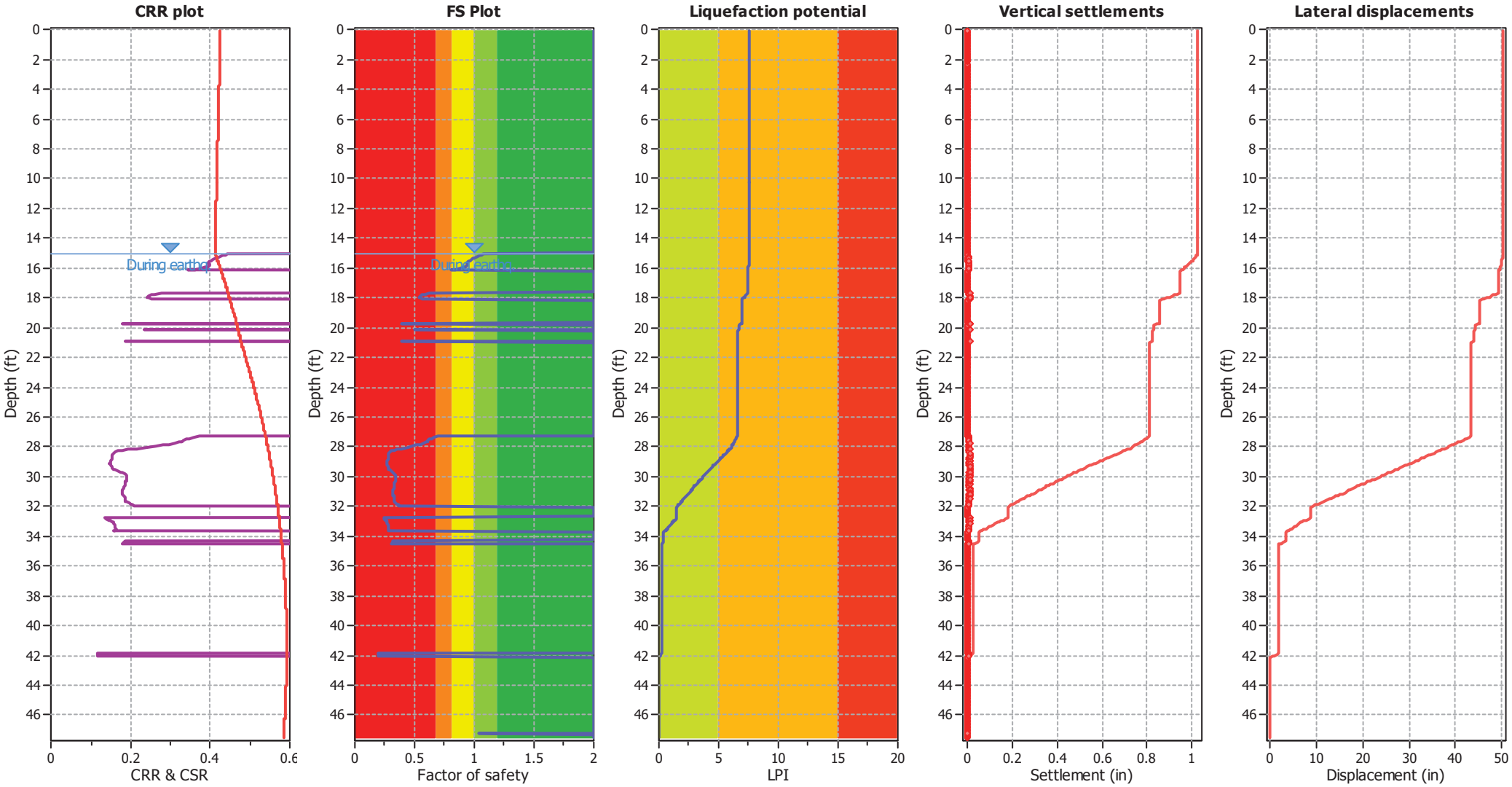
Liquefaction analysis overall plots



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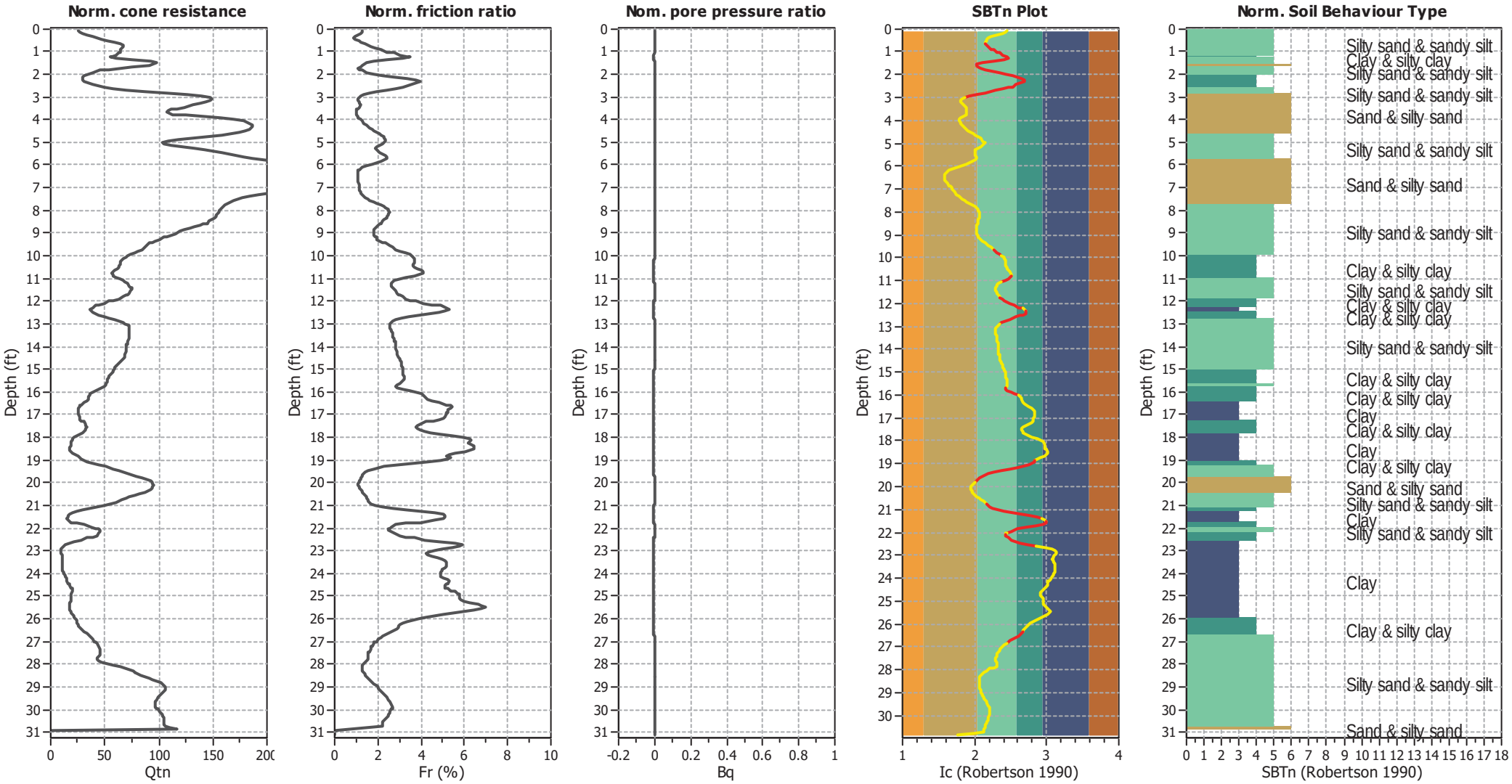

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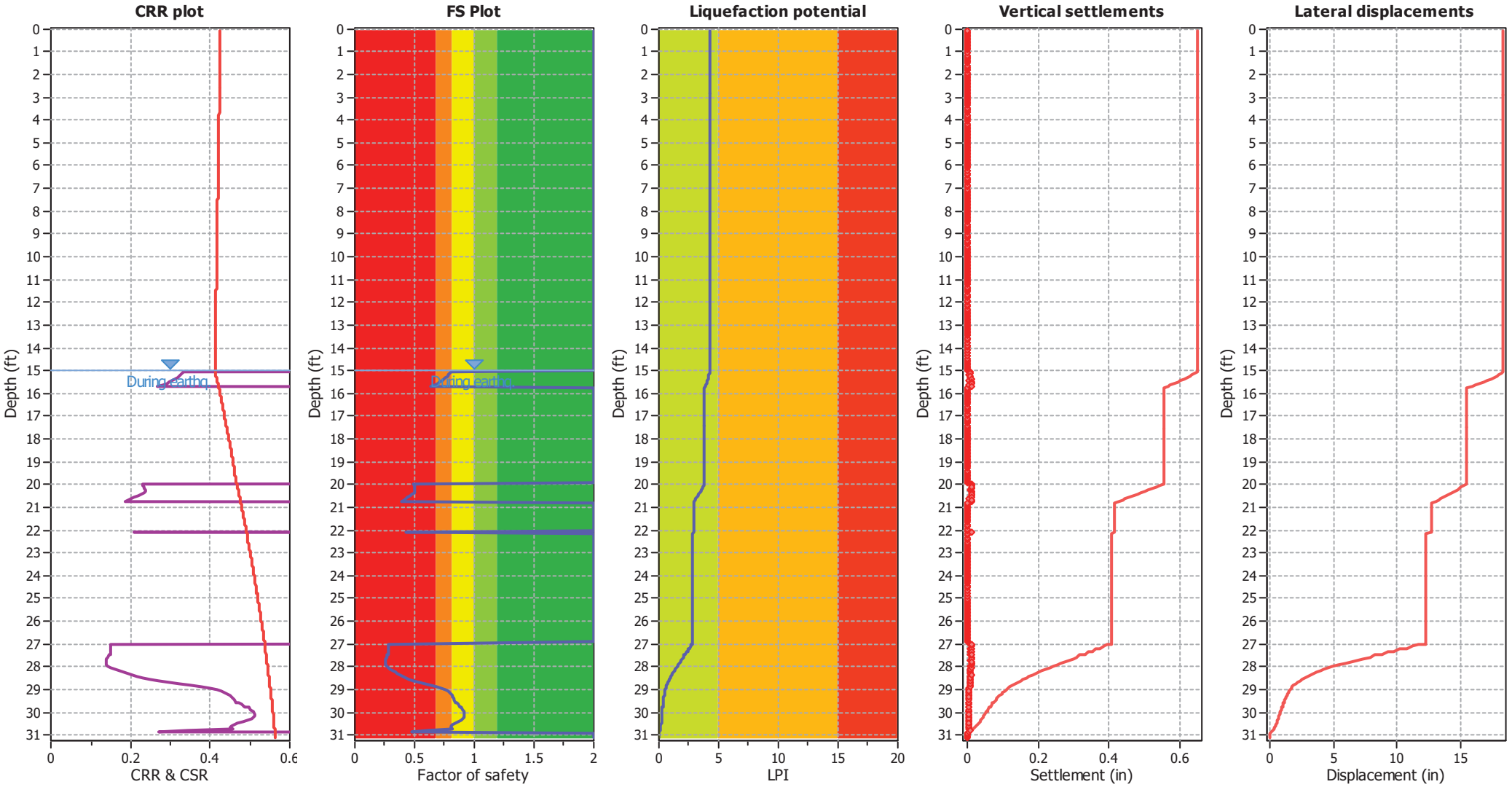

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Joel Duarte
District Director of Facilities
Hacienda La Puente Unified School District
15959 E. Gale Avenue
City of Industry, CA 91745

September 22, 2023

Subject: **Fourth Engineering Geology and Seismology Review for Temple Academy – Performing Arts Theater**
635 North California Avenue, La Puente, CA 91744
CGS Application No. 03-CGS5645

Dear Mr. Duarte:

In accordance with your request and transmittal of additional documents received on August 30 and September 20, 2023, the California Geological Survey (CGS) has reviewed the engineering geology and seismology aspects of the consulting reports prepared for the subject project at Temple Academy in La Puente. We understand that this project involves construction of a new performing arts theater that will be supported by shallow foundations bearing on improved site soils. This review was performed in accordance with Title 24, California Code of Regulations, 2019 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following documents for this additional review of the project:

7. **Response to California Geological Survey (CGS) for Third Engineering Geology and Seismology Review, Hacienda La Puente Performing Arts Center (PAC), 635 North California Avenue, La Puente, CA 91744:** Western Ground Improvement, Inc., 209 Avenida Del Mar, Suite 201B, San Clemente, CA 92672; company Project No. GLA-189 / NLA-48, report dated August 10, 2023, 3 pages, 3 attachments.

8. **Response to 3rd Review of Engineering Geology/Seismology from California Geological Survey, Proposed Performing Arts Center, Temple Academy, 635 N. California Avenue, La Puente, California:** Geotechnical Professionals Inc., 5736 Corporate Avenue, Cypress, California 90630; company Project No. 3097.I, report dated August 14, 2023, 4 pages, 2 attachments.

9. **Design Submittal for a *Geopier*® Foundation System, Hacienda La Puente Performing Arts Center (PAC), 635 North California Avenue, La Puente, CA 91744:** Western Ground Improvement, Inc., 209 Avenida Del Mar, Suite 201B, San Clemente, CA 92672; company Project No. GLA-189 / NLA-48, revised report dated September 20, 2023, 1 page, attachments (including shop drawings dated September 20, 2023 (Rev. 2), including sheets GP0.1, GP0.2, and GP1.1).

10. **Calculations Package for a *Geopier*® Foundation System, Hacienda La Puente Performing Arts Center (PAC), 635 North California Avenue, La Puente, CA 91744:** Western Ground Improvement, Inc., 209 Avenida Del Mar, Suite 201B, San Clemente, CA 92672; company Project No. GLA-189 / NLA-48, revised report dated September 20, 2023, 1 page, attachments (settlement calculations and CPT Liquefaction calculations).

11. **Quality Control Package for a *Geopier*® Foundation System, Hacienda La Puente Performing Arts Center (PAC), 635 North California Avenue, La Puente, CA 91744:** Western Ground Improvement, Inc., 209 Avenida Del Mar, Suite 201B, San Clemente, CA 92672; company Project No. GLA-189 / NLA-48, revised report dated September 20, 2023, 1 page, 2 attachments.

12. **Updated Review of Ground Improvement Submittal, Proposed Performing Arts Center, Temple Academy, 635 N. California Avenue, La Puente, California:** Geotechnical Professionals Inc., 5736 Corporate Avenue, Cypress, California 90630; company Project No. 3097.I, report dated September 20, 2023, 2 pages.

In addition, we previously reviewed the following reports:

1. **Revised Geotechnical Investigation, Proposed Performance Arts Center, Temple Academy, 635 N. California Avenue, La Puente, California:** Geotechnical Professionals Inc., 5736 Corporate Avenue, Cypress, California 90630; company Project No. 3097.I, report dated June 2, 2022 (Revised July 12, 2022), 21 pages, 2 figures, 6 appendices.

2. **Response to Geotechnical Report Comments from California Geological Survey, Proposed Performance Arts Center, Temple Academy, 635 N. California Avenue, La Puente, California:** Geotechnical Professionals Inc., 5736 Corporate Avenue, Cypress, California 90630; company Project No. 3097.I, report dated January 11, 2023, 5 pages, 3 appendices.

3. **Review of Ground Improvement Submittal, Proposed Performing Arts Center, Temple Academy, 635 N. California Avenue, La Puente, California:** Geotechnical Professionals Inc., 5736 Corporate Avenue, Cypress, California 90630; company Project No. 3097.I, report dated May 19, 2023, 2 pages.

4. **Design Submittal for a *Geopier*® Foundation System, Hacienda La Puente Performing Arts Center (PAC), 635 North California Avenue, La Puente, CA 91744:** Western Ground Improvement, Inc., 209 Avenida Del Mar, Suite 201B, San Clemente, CA 92672; company Project No. GLA-189 / NLA-48, report dated June 14, 2023 revised, 1 page, attachments (shop drawings dated December 6, 2022, including sheets GP0.1, GP0.2, and GP1.1).

5. **Calculations Package for a *Geopier*® Foundation System, Hacienda La Puente Performing Arts Center (PAC), 635 North California Avenue, La Puente, CA 91744:** Western Ground Improvement, Inc., 209 Avenida Del Mar, Suite 201B, San Clemente, CA 92672; company Project No. GLA-189 / NLA-48, report dated June 14, 2023 revised, 1 page, attachments (settlement calculations and CPT Liquefaction calculations).

6. **Quality Control Package for a *Geopier*® Foundation System, Hacienda La Puente Performing Arts Center (PAC), 635 North California Avenue, La Puente, CA 91744:** Western Ground Improvement, Inc., 209 Avenida Del Mar, Suite 201B, San Clemente, CA 92672; company Project No. GLA-189 / NLA-48, report dated June 14, 2023 revised, 1 page, 1 attachment.

CGS previously submitted our findings regarding this project in review letters dated December 23, 2022, January 18, 2023, and July 20, 2023. In our third review letter, CGS requested the specialty ground improvement contractor, Western Ground Improvement (WGI), to address our concerns regarding their design, plans, and field verification testing for the proprietary ground improvement system of compacted aggregate piers (CAPs) (called GeoPier® Rammed Aggregate Piers, hereafter referred to as GeoPiers) proposed to be installed for the project. In addition, CGS requested the consultants to review WGI's revised design package and plans and submit formal documentation of their review to CGS and the Division of the State Architect (DSA).

Discussion of Ground Improvement Design and Plans

In our third review letter, CGS requested WGI to address several concerns regarding their design, plans, and field verification testing for the GeoPier ground improvement system proposed to be installed at the site.

In their response (Reports 7 through 10), WGI has addressed the concerns noted by CGS in our previous review and reports they have shortened the design length of the GeoPiers to optimize the design and satisfy the performance criteria recommended by the geotechnical consultants. WGI performed updated CPT-based liquefaction and seismic settlement analysis for the design using a consistent and **revised GeoPier shaft length of 20 feet below bottom of foundation/slab.** WGI performed analysis both with and without application of the depth-weighting factor for settlement (based on Cetin et al., 2009) and they provide the results of all analysis for comparison. Based on the results of their revised analysis for the post-improvement conditions, WGI reports that the maximum calculated static and liquefaction settlement (without depth weighting) is about 0.2 inches and 1.2 inches, respectively, and the combined settlement of about 1.5 inches satisfies the design criteria. WGI adds verification testing requirements for the improved soils in their Quality Control Package which indicates **seven (7) cone penetration test (CPT) field verification tests will be performed.** They state that the locations shown on the plan are preliminary and the final locations for the verification CPTs will be determined with input from the Geotechnical Engineer-of-Record (GEOR) for the project. Based on our review of the latest version of the design package and drawings provided by WGI, CGS understands that **WGI plans to perform two (2) modulus tests to confirm the GeoPier design** and satisfy the consultants' recommendations.

In our previous review, CGS requested the consultants to review WGI's revised GeoPier design package and plans and submit formal documentation of their review to CGS and DSA in order to fulfill their role as GEOR for the project. In their response (Report 12), the consultants report they have reviewed the most recent submittal for the ground improvement system prepared by WGI for the proposed Performing Arts Center at Temple Academy and take no exception to the optimized re-design of GeoPier length by WGI. The consultants state the geotechnical design parameters used in the ground improvement submittal substantially conform to the site soil conditions and recommendations in their report dated July 12, 2022 (Report 1), and the objectives for ground improvement outlined in WGI's submittal substantially conform with the recommendations in their reports.

Altogether and based on the information provided, the recommendations, design, and plans for the proposed GeoPier ground improvement system appear to be reasonable and appropriate for the reported site conditions, and appear to adequately address the engineering geologic and seismic hazards to be mitigated as part of the project. Therefore, **no further information is requested from the consultants or WGI by CGS at this time**. However, CGS notes that the DSA may provide separate comments and/or request additional information regarding bid set plans and specifications for the ground improvement that should be addressed by the design team.

The geotechnical consultants should be engaged to provide monitoring of the GeoPier ground improvement program, including installation, verification testing, and required special inspections, under their authority as the GEOR for the project. **After completion of the recommended ground improvement program, the geotechnical consultants should provide a comprehensive final report for CGS review** that documents their observations, testing, and analysis, including the data collected to satisfy the field performance (acceptance) criteria. The report should demonstrate the design and performance criteria for the ground improvement program have been satisfied and should include (at minimum):

- All GeoPier installation logs/records, field-testing records, as-built plan and record of installed GeoPiers, and daily field reports from both the contractor and the GEOR's field representative(s).
- All QA and QC data and reports including records of compaction and volume of aggregate installed for each GeoPier.
- All CPT field verification test data and all GeoPier modulus/load test data.
- Results of analysis of the improved soils that clearly demonstrate the design and performance requirements for the GeoPier ground improvement project are met based on the defined acceptance criteria. For consistency, the CPT-based analyses of post improvement verification testing data for liquefaction triggering and seismic settlement estimation should follow the same methodologies used by the geotechnical consultants in their analyses of the existing site conditions.
- Any other pertinent data and/or observations made during the performance of the ground improvement program that is considered in assessing the satisfaction of the design objectives.
- Discussion and conclusion(s) regarding satisfaction of the GeoPier design and performance requirements for the project.

Conclusion

In conclusion, *the engineering geology and seismology issues at this site are adequately assessed in the referenced reports*. ***The project is provisionally accepted***, as we request additional documentation from the consultants following the completion of the ground improvement program, as discussed above. The consultants are reminded that one copy of all supplemental documents should be submitted, should include the CGS application number, and should be uploaded directly to CGS at this link: https://www.conservation.ca.gov/cgs/upload-school. If you have any further questions about this review letter, please contact the primary reviewer at YaoHsien.Chang@conservation.ca.gov.

Respectfully submitted,

Yao Hsien Chang
Geotechnical Engineer
PE 77688, GE 3082

Concur:

Chase White
Senior Engineering Geologist/Geotechnical Engineer
PG 8530, CEG 2489, PE 73664, GE 2938

Copies to:

Thomas G. Hill, *Certified Engineering Geologist*, and Donald A. Cords, *Registered Geotechnical Engineer*
Geotechnical Professionals Inc., 5736 Corporate Avenue, Cypress, CA 90630

Ryan P. Bulatao, *Registered Geotechnical Engineer*
Western Ground Improvement, Inc., 209 Avenida Del Mar, Suite 201B, San Clemente, CA 92672

Richard Ingrassia, *Architect*
Rachlin Partners, 8640 National Boulevard, Culver City, CA 90232

Douglas Humphrey, *Regional Manager*
Division of State Architect, 355 South Grand Avenue, Suite 2100, Los Angeles, CA 90071