ADDENDUM NO. 2

BID NO. 2022PW01

CHINO INSTRUCTIONAL BUILDING
FROM
PREQUALIFIED CONTRACTOR

CHAFFEY COMMUNITY COLLEGE DISTRICT
RANCHO CUCAMONGA, CALIFORNIA
COUNTY OF SAN BERNARDINO

February 11, 2022

Chaffey College

CHAFFEY COMMUNITY COLLEGE DISTRICT
5885 Haven Avenue
Rancho Cucamonga, CA 91737

BID NO. 2022PW01 CHINO INSTRUCTIONAL BUILDING FROM PREQUALIFIED CONTRACTORS

The following changes, additions, deletions, clarifications, or corrections shall become part of the Proposal for Chaffey Community College District, **BID NO. 2022PW01, CHINO INSTRUCTIONAL BUILDING** at the **Chaffey Chino Campus,** first advertised January 11, 2022. All other terms, specifications, and conditions remain the same. Each proposer is responsible for transmitting this information to all affected subcontractors and suppliers prior to the receipt of proposals. Each proposer shall acknowledge receipt of this Addendum on their Proposal.

ITEM 1: ONE HUNDRED SEVENTY-EIGHT (178) QUESTIONS & ANSWERS FOR CLARIFICATION AS OF FEBRUARY 4, 2022.

RFC #1
Question:
Please confirm that Cleaning of New Ductwork per Section 233113 paragraph 3.13 is not required if ductwork passes the Duct System Cleanliness Test per Section 233113 paragraph 3.14.C.

Answer: Confirmed that the cleaning of New Ductwork per section 233113 paragraph 3.13 is NOT required if ductwork passes the Duct System Cleanliness Test per Section 233113 paragraph 3.14.C and complies with section 233113 paragraph 3.01.L of the specification.

RFC #2
Question:
The Chino Hills Instructional Building is noted as a II-B, which is a 0-hour rating. This is based on the notes from the Project Data Info sheet G0.11. There are a other notes specifying fireproofing on the wall details, not is there any intumescent fireproofing identified. Are there any specific areas in need of fireproofing on this project?

Answer: Contractor shall refer to plans & specifications for walls and other items which require fire rating. The building is correctly noted as a type II-B building.

RFC #3
Question: There is a form for subcontractor listings in the bid forms, however when submitting through planet bids there is also a section to enter subs individually. Will you be requiring both the sub listing form and the subs to be entered on planet bids? Or is just the sub listing form ok?

Answer: The College requires both the sub listing form included in the Bid forms and the PlanetBids Subcontractor information submitted by the bid deadline to meet the intent of the Bid requirement. To avoid confusion and clerical error corrections, ensure that Subcontractor companies on both lists match and are consistent.

RFC #4

Question: Spec Section 08 80 00 Glazing - This section is calling for Glass Type GL-1, GL-2, GL-3, and GL-4 to have the exterior lite Tinted with Solarban 70 on surface number two, 1/2" air space, and ¼" Clear interior lite. It then goes on to specify Visible Light Transmittance to be 79% with Solar Heat Gain Coefficient on 0.70. The performance numbers are unachievable with the given glass make up. Please review Vitro Performance Chart showing all the different tinted glass types with Solarban 70. Please revise performance values or glass type all together.

Answer: Specification Section 08 80 00 Sections 2.02A.1.a.1, 2.02B.1.a.1, 2.02C.1.a.1, and 2.02C.1.a.1, shall be updated to read "Visible Light Transmittance of 64%, solar heat gain coefficients of 0.27" See revised Specification Section.

RFC #5

Question: NEOPRENE EXPANDABLE Please provide more information regarding "Neoprene Expandable Joint Sealant" as shown in details 5, 7, 10, 19, 20 on sheet A10.23. Please provide specification if possible.

Answer: Refer to Specification Section 07 95 13 – Expansion Joint Cover Assemblies, Section 2.02, B, 2.

RFC #6

Question: Are you planning on extending the bid date? Since the day before the bid is a Federal Holiday?

Answer: No. The College is not planning to extend the bid date.

RFC #7

Question: Please provide size of EMH#6

Answer: EMH #6 shall be 5' (W) x 10'6" (L) x 7'(H) Utility Vault CAD ED-5106.

RFC #8

Question: Please provide specs for new 750KVA VPI Substation

Answer: See new Specification Section 26 11 16.12 added as part of this addendum.

RFC #9

Question: Specifications are listing OTIS GENII as the only qualified bidder for elevator trade. Are other elevator vendors accepted as an approval equal? Please advise

Answer: Contractor shall refer to the Bidding Documents for procedures and requirements for any and all proposed substitutions. See answer to RFC #15 for additional information.

RFC #10

Question: Is the AV scope for the Chino Instructional Bldg. OFOI or by others? There are AV plan sheets but no AV spec, Eqp list, or Wiring diagrams. Please advise.

Answer: The "AV" sheets in the drawing set are for reference for the OFOI equipment. The "EAV" sheets are AV infrastructure plans (conduits, boxes, mounting/backing, etc.) are CFCI and are to be included in the bid. Please note that the ALS kits specified in Section 27 51 26 are CFCI, and Projection Screen for Multi-purpose Room 101 that is specified in Section 11 52 13 is CFCI.

RFC #11

Question: On the Bid Form that was provided with the documents, there is no space to fill out the Base Bid dollar amount (which is unusual), is there going to be a new Bid Form that will have a space for us to fill out the Base Bid dollar amount (both in numeric numbers and wordings)? Please note that on the Bid Form page BF-2 the space provided for us to fill out is for the Bid Bond (or Bid Security) dollar value. Please clarify.

Answer: The contractors to provide Base Bid and Daily Rate compensation in the Line-Item Section of PlanetBids.

RFC #12

Question: Reference Section 4 Bidder Information Form of the Bid forms, Section 4.A, 4.B, 4.D and 4.E. Since we have already gone through the extensive prequalification process and have been prequalified as a General Contractor, please confirm we do not need to provide these information with the bid. Please note that only Section 4.C have the word "Not Applicable" already printed on. Please clarify.

Answer: "Not Applicable" should apply to Sections 4A, 4B, 4D and 4E. Information being requested has already been provided by the bidders during the prequalification process.

RFC #13

Question: Reference Specification 31 23 00 paragraph 1.02, Specification 31 23 33 paragraph 1.05, Specification 33 05 00 paragraph 1.04, Specification 33 14 00 paragraph 1.04, these all have verbiage of Unit Prices, please confirm these Unit Prices are not required to submit on bid day and are not required for the project since there is no Unit Prices on the Bid Form. In the event they are required then identify them and issue out a new Bid Form.

Answer: Unit prices are not required. See revised Specification Sections 31 23 00, 31 23 33, 33 05 00, & 33 14 00.

RFC #14

Question: Please confirm there are no Alternates required to submit on bid day for the project and no Alternates required to fill out on the Bid Form.

Answer: Confirmed.

RFC #15

Question: Division 27, page 1277, section 27 15 00-1, 2.1.A.1. Would Chaffey College accept a substitution from Commscope to an end to end solution by Siemon? Siemon will provide a 25 year warranty covering products, performance, and applications assurance.

Answer: Contractor may request a substitution of products, materials or processes, other than those specified per the provisions of the General Conditions and the contract documents. Each Substitution Request Form must be accompanied by evidence for the items listed in the General Conditions Article 3.11.5.3. Request for substitutions will be evaluated with a bidding contractor's bid. The Owner will neither accept nor review substitution requests directly from a supply vendor or subcontractor.

CLARIFICATION: General Conditions Article 3.11.5.3 Substitution Request OWNER decision. **ADD** the following provisions. "After Bid Opening, if the Contractor submitting the substitution is the lowest apparent bidder and the Substitution request is not acceptable to the OWNER, then the Contractor's bid shall be deemed non-responsive and will be rejected. The OWNER will then award the project to the next lowest responsive bidder."

DELETE last paragraph of Article 3.11.5.3 and **REPLACE WITH** "The deadline by which Contractor must submit a request for substitution of products, materials or processes, is no later than the Bid Due date. Substitution requests will be reviewed during the bid evaluation period for conformance with the contract documents."

RFC #16

Question: Please provide specification for Audio Visual equipment & missing AV single-line/schematic diagrams showing equipment connectivity and cable types

Answer: Please see response to RFC #10 above.

RFC #17

Question: What size conduit is required for the future rooftop PV?

Answer: Contractor to provide (2) 3" conduits from the main switchboard to the roof with watertight caps for future PV panels.

RFC #18 (INTEGRAL)

Question: Spec 26 05 19 - 2.03 describe the cabling type required for the Photovoltaic System. Please confirm the PV system is future and not part of this contract. If so, please confirm on conduit/box rough-in for the future system is required.

Answer: PV system (and any cabling required for them) are future and NIC. See response to RFC #17 for infrastructure required.

RFC #19
Question: Please confirm that Section 6 - Disabled Veterans Business Enterprise Requirements in the Bid Form does not require a signature.

Answer: Confirmed.

RFC #20
Question: 14 21 00 par. 1.02-A lists Otis Elevator Gen2 as the specified system. Please confirm if "or equal" elevator systems from different manufacturers will be accepted as a substitution.

Answer: Please see response to RFC #9 above.

RFC #21
Question: 051200 par. 1.06-A & 1.06-B specify that the fabricator & installer that "participates in the AISC Quality Certification Program and is designated as AISC-Certified". Confirm that this should be "follows the AISC Quality Certification Program" OR another option would be to allow LA City Certification since many steel bidders follow that program and it is more stringent, otherwise this may limit the number of Steel bidders.

Answer See revised Specification Section 05 12 00 for updated requirements for fabricator and installer.

RFC #22
Question: 051210 par. 2.03-C specifies three types:f AESS-1, AESS-2, AESS-3. Confirm which of these is the basis-of-bid for this project, or if all are required.

Answer: See revised Structural sheets as part of this addendum for required AESS levels.

RFC #23
Question: The only location where AESS is identified on the drawings are on S9.01 & S9.02, Note #2 indicates ALL STEEL NOTED THUS (*) SHALL BE AESS. However no where on these two sheets S9.01 & S9.02 have the asterisk symbol (*). Are Stairs #1 and #2 to be AESS and no where else on the project requires AESS?

Answer: See response to RFC #22 above.

RFC #24
Question: 055100 Metal Stairs par. 3.05-A specifies High Performance Coating per Section 099000, so confirm that the Interior Metal Stairs are to be painted with the HPC per 099000 par. 3.10 instead of par. 3.09-B Interior Paint for Steel.

Answer: Confirmed.

RFC #25

Question: 072100 par. 2.03-A-2 Second sentence specifies 10" thick between floors. Confirm that this is not to be included since none is shown on the drawings, or if required provide the locations for this 10" sound batt insulation.

Answer: Requirement for 10" sound batt insulation between floors shall not be required, and has been removed from the specifications. See revised Specification Section 07 21 00.

RFC #26

Question: 076200 par. 3.03-M Interior Roof Drains specifies 16 oz. Copper 30x30 and in parentheses (0.024" Stainless Steel), and to refer to drawings. Detail 11/A10.41 does not identify this material type and Detail 12/A10.41 shows a size of 36x60. Also, refer to Section 075500 Roofing par. 2.04-C Drain Flashings specified as 4 lb sheet lead. Confirm the material type & size that is required.

Answer: Section 07 62 00, par. 3.03M has been deleted. Contractor shall utilize Section 07 55 00 for this work. See revised Section 07 62 00.

RFC #27

Question: 076200 par. 3.03-Q specifies 24 gauge and in brackets [26 gauge stainless steel]. Confirm the gauge thickness and material type.

Answer: Section 07 62 00 par. 3.03Q has been updated. See revised Section 07 62 00.

RFC #28

Question: 078400 par. 2.04-A Fire Safing specifies 4-inch thick, but Detail 8/A10.13 shows 6-inch wide x 6-inch thick Fire Safing. Confirm the basis-of-bid dimensions.

Answer: The intent of the Fire Safing shown in detail 8/A10.13 is to run the width of the exterior stud. The thickness shall be as indicated in the specifications.

RFC #29

Question: 081313 par. 2.02-A HM Interior Doors specifies an 18-gauge face and there is no specification paragraph for the Exterior HM Doors, however per A9.11 HM Doors 100-A-A, 105-A, 106-A, 300-A are at exterior locations. Confirm that the 18-gauge face is acceptable for these exterior doors or if these should be 16-ga. or even 14-ga. instead. Note that Section 081213 par. 2.02-A HM Frames specifies 16-guage, so if the HM Door is increased in thickness, confirm that the exterior HM Frame should be increased as well.

Answer: See revised Sections 08 12 13 and Section 08 13 13.

RFC #30

Question: 099000 par. 1.04 Maintenance Materials calls for 10% Paint of each type, this seems like alot and would take up alot of storage space. Confirm that this percentage is correct, or if it should be changed to a maximum of 5 gals. or 10% whichever is lesser.

Answer: See Revised Specification Section 09 90 00 for revised Attic Stock and Closeout requirements.

RFC #31

Question: 099000 par. 2.01-A-1 calls for Dunn-Edwards or approved equal. Confirm that per par. 3.06-A that Benjamin Moore, Sherwin-Williams, Coast-to-Coast, Rust-Oleum as well as par. 3.10-A listing PPG, Tnemec, and Carboline are approved equals, and therefore do not need to be requested as a pre-approved substitute.

Answer: Benjamin Moore, Sherwin Williams, Coast-to-Coast, Rust-Oleum are approved equals only for items listed under Section 09 90 00, 3.06A, and PPG, Tnemic, and Carboline, are approved equals for items listed under Section 09 90 00, 3.10A only. All other locations and applications shall be Dunn-Edwards or Approved Equal as outlined in Section 09 90 00, 2.01A.1, and will require substitution per Division 01. Refer to RFC# 15 for additional information.

RFC #32

Question: 108113 par. 2.02-B-3 & par. 3.03-C-2 Spectrum V Holographic Bird Gel list quantities "as required for complete installation", and Sheets A4.11A & A4.11B refer to Detail 9/A10.41 which calls for Bird Deterrent Gel per Mfr. After contacting the manufacturer they suggested that this gel has about a 6-month life and has wide range of suggested quantities. Confirm if this Gel is required to be installed and if so provide the on-center spacing so that the bidders can determine the quantity required.

Answer: Per Section 10 81 13, Spectrum V Holographic Bird Gel is required on all horizontal roof ledges not specified to receive the Electronic Bird Deterrence system. Contractor shall refer to sheets A4.11A & A4.11B for locations where the Spectrum V Holographic Bird Gel is required vs Electronic Bird Deterrence System. and install per manufacturer's recommendations.

RFC #33

Question: 125917 IRYS Pods par. 2.05-B,H, I, L all specify Section 087100 for the hardware at the IRYS Pods, however A2.11B Keynote 12.74 for the three pods as shown do not indicate a Door Tag and is not found in Section 087100. 125917 par. 2.05-J states Hardware shall be: -1 Furnished and installed by the relocatable wall manufacturer, -2 (OR) Furnished by the finish hardware contractor to the relocatable wall contractor for this installation. So the bidders need direction as to which is the basis-of-bid, and if -2 is selected, then a Hardware Set would need to be issued for those 3 doors.

Answer: Hardware shall be furnished and installed as part of the Wall Systems Furniture System. See revised Specification Section 12 59 17.

RFC #34

Question: 312300 par. 3.22-A specifies that any Surplus soil is to be either stockpiled or spread as directed by College Project Manager. Please provide the location for the stockpile, or provide the location where any excess spoils is to be spread and specify the manner. We suggest a stockpile as the basis-of-bid, and can adjust that in the future if spreading it is desired as this topic will depend upon how much spoils are generated.

Answer: Surplus soils shall be hauled offsite and disposed at an approved disposal site. See revised Section 31 23 00.

RFC #35

Question: 321313 par. 2.01-B calls for 2500 psi site concrete, and Details 1,2/C9.00 do not state the concrete paving psi strength. Confirm that 2500 psi is the basis-of-bid, as we would suggest either 3000 psi or 3500 psi instead especially for the Heavy Duty 6" pavement.

Answer: Details 1 & 2 / C9.00 refer to the project Geotech report for pavement recommendations. Per email correspondence with Geocon dated Feb. 7, 2022, 3500psi compressive strength concrete shall be used for detail 2/C9.00 Heavy Duty Concrete Pavement. A minimum of 3000psi compressive strength concrete shall be used for detail 1/C9.00 Concrete Pavement.

RFC #36

Question: 329300 par. 2.12-C specifies that the Root Barriers are either 18-inch or 36-inch deep depending on closeness to a sidewalk, however Detail F/L3.51 Note 3 calls for 24" min. high Root Control Barrier per Planting Notes Unless Specified Otherwise. For the basis-of-bid, confirm which supersedes between the specs & the Details. Note that the Root Control Barriers are not shown on the L3.01 & L3.02 Planting Plans, and our preference would be that a basis-of-bid Root Barrier Symbol be shown at all required locations rather than have all the bidders measure the Detail F/L3.51 Note A 20' distance from any structure, concrete flatwork, curb & gutter, Utilities, etc., because the Utilities are all over the site and "etc" is not defined specifically.

Answer: Contractor shall follow the requirements set forth in the specification section 32 93 00 paragraph 2.12C. See revised detail F/L3.51.

RFC #37

Question: 221123 par. 2.01-A-3 specifies Centrifugal Pump Grundfos Model UP 15-10 B7/TLC, however P0.02 Pump Schedule CP-1 calls for a Grundfos Model UPS-26-99-BUAC/T. Confirm which supersedes and is required for this project.

Answer: The pump specified on Sheet P0.02 – RECIRCULATION PUMP SCHEDULE is correct. See revised Specification Section 22 11 23.

RFC #38

Question: Reference Division 00 General Conditions-101 (pdf page 170/171 of 567) Article 13.5.2.C, it indicates Owner shall pay for testing & inspection inside a fifty (50) mile radius from the Project Site, including, but not limited to, travel, shipping or supervision charges or expenses of any kind. And it goes on to indicates that Contractor will pay for all costs borne by inspections outside the parameters listed by the OWNER above. Costs or expenses of inspections outside a fifty (50) mile radius from the Project Site, including but not limited to, travel, shipping or supervision charges or expenses of any kind will be paid by the Contractor. Please confirm the the Owner will cover the costs for testing and inspection as long as the fabrication is within the continental United States, since typically this by the Owner.

Answer: Owner will cover the cost of the inspections during normal business days and hours outside a fifty-mile radius. However, Contractor will pay for all costs or expenses associated with traveling to perform inspections outside a fifty-mile radius from the Project site and inspections outside normal business hours or practices, including but not limited to travel or mileage, lodging, shipping, additional materials, added communications costs, overtime premiums, etc.

RFC #39

Question: 224713 par. 2.01 specifies the Drinking Fountains as Haws Model 3150 (No Substitutions), noting that P0.02 does not have a Schedule for DF-1 and there are two as shown on P3.00, so confirm that the specifications define the basis-of-bid for DF-1.

Answer: See revised Sheet P0.02 and specification section 22 47 13 for correct drinking fountain model.

RFC #40

Question: 233113 par. 3.13 specifies Duct Cleaning, confirm that Duct Cleaning as specified is to be included by the bidders since the ductwork is new construction.

Answer: See response to RFC #1 above.

RFC #41

Question: The laydown area map provided in Section 01500-A provides areas to the south and west of the construction limits not included in the plans. The "alternative entrance for construction" to the west will require demolition of existing fencing in order to access the construction site. Please provide clear instructions or a narrative describing the scope of demo work required in the "allowed construction lay down area."

Answer: During the site walk on January 20, 2021, bidders were notified that sections of the existing fences required demolition to access the site. The College recommended the Contractor consider a gate at the far west end of the existing fence to get direct southbound access from the road. However, further detailed access and construction routing to the site is up to the Contractor in exercising their means and methods within the parameters of the contract requirements. i.e. damaged or modified existing structures/utilities and conditions must be repaired or replaced, avoid routes through the west parking lot area, no work is to occur south of the new temporary fence, existing utilities are to be protected in place, etc.

CLARIFICATION: Specification Section 01500 Construction Facilities, Use of Premises & Temporary Controls, 1.03, A. **ADD THE FOLLOWING:** "On existing sidewalks and flatwork, CONTRACTOR must secure the fence by reasonable means to prevent the fencing from falling over and minimize damage to the existing flatwork. CONTRACTOR will utilize stands, weights, kickers, bracing, etc. to prevent the fence from being knocked down or damaged by the by the wind or pedestrian/object interaction/collision. CONTRACTOR shall restore and, if necessary, replace all areas that have been damaged by the fence installation."

Specification Section 01500 Construction Facilities, Use of Premises & Temporary Controls, 1.03, B. **ADD THE FOLLOWING:** "Windscreens will have adequate numbers of wind vents to prevent the fence from falling or becoming a hazard to people and property."

RFC #42

Question: E1.22 shows 37 Light Fixture Type P is 8'-2" high + 63 Type Q is a low bollard per the E0.03 Light Fixture Schedule. Detail F/L1.53 shows a 1'-6" round x 2' deep Light Pole Base. Confirm that the bidders are to include this footing for both of these fixtures, noting that this footing seems to be for the Type Q low bollard but the taller 8'-2" high Type P fixture might need a bigger footing. Note that Detail F/L1.53 Note A refers to Structural Engineer's plans for footing design, however the S-drawings do not have this design.

Answer: Detail F/L1.53 is applicable to Type Q lights only. For footings on the Type P lights, see new detail 9/A10.01.

RFC #43

Question: E1.22 Reference Note 3 and L1.00 thru L1.02 Reference Legend 20 shows 3 each Blue Phone locations. Confirm if the bidders are to include a footing for these Blue Phones, and if so provide the dimensions, concrete strength, rebar size & spacing, and finish if any concrete is exposed.

Answer: Emergency phones are OFOI. Contractor is responsible for providing utility connections as shown on the drawings

RFC #44

Question: L1.00 Master Construction Legend, the following items are listed as TBD so please provide the basis-of-bid information: SA-5, SA-6, SA-15 Finish SA-13, SA-14, SA-16 Color.

Answer: See revised Sheet L1.00.

RFC #45

Question: C2.00 & C3.00 Legend, Compacted Fire Access Road per Detail 2/C9.00 should be Detail 3/C9.00 instead.

Answer: Detail reference shall be updated to reference detail 3/C900. See revised sheets C2.00 & C3.00/

RFC #46

Question: C4.00 along bottom in the middle is a callout for Construction Note 11 that should be Note 10 for the Sewer Manhole.

Answer: Construction note referenced shall be updated to Note 10. See revised sheet C4.00.

RFC #47

Question: C4.00 at top middle by the curved Seat Walls are two unlabeled circles that appear to be for Construction Note 17 SD Cleanouts at the diagonal Storm Drain pipe. Please confirm.

Answer: Unlabeled circles on Storm Drawing line shall be updated to Note 17. See revised sheet C4.00.

RFC #48

Question: Please provide a legend description for the diagonal hatching beneath the cloud ceilings on 4/A3.11B.

Answer: Contractor shall disregard the diagonal hatch shown beneath the cloud ceiling on 4/A3.11B.

RFC #49

Question: Sheet G1.21 indicates this is a (0-NR) zero-nonrated building, please confirm spray applied fireproofing is not required on this project. However in the event spray applied fireproofing is required then please provide a specification and rating required. There are a few details that have notes of fireproofing where occurs (16&17/A10.31).

Answer: This project is a non-rated building, as such spray applied fire proofing is not anticipated on the project.

RFC #50

Question: A10.51 Detail 25 calls for a Metal Pipe Rail standard PTD, however Detail 1 refers to this detail and it is for a Stainless Steel Handrail. Confirm that Detail 25 should be SS instead.

Answer: See revised Detail 25/A10.51.

RFC #51

Question: Please confirm there is no lead lined walls required on the project. There are lead lined notes referenced on the wall types 1/A10.11 under Table A - Height Variable (Designation D through J) and on door schedule A9.11 under door material/finish legend "SHD" but we are unable to locate this on the architectural wall type floor plans.

Answer: Confirmed there are no lead lined walls on this project.

RFC #52

Question: Specification 05 12 00 Structural Steel Framing section 1.06, B is asking for erector that is AISC Certified. Please advise if the AISC certified erector can be waived if the erector has 18 years of experience in similar work in the California market.

Answer: See response to RFC #21 above.

RFC #53

Question: Could not locate a detail for site lighting foundations, please advise.

Answer: Contractors shall refer to response to RFC #42

RFC #54

Question: Is there any BIM requirements for this project?

Answer: The District does not have any existing requirements at this time. Coordination with the Architect will be required.

RFC #55

Question: Are MEP subcontractors required to pre-qualify with the district to perform work?

Answer: No.

RFC #56

Question: Sheet G1.21 requires Class I standpipes for the project but the FP plans/DSA Approved plans do not show one. Is the a requirement for standpipes in the building and if so please provide locations.

Answer: A standpipe system is not required per the 2016 CFC Section 905.3.1(1) thru 905.3.1(5).

RFC #57

Question: Spec 01310 "Contractor's Construction Schedule" calls for Primavera "P6" release 18.8 or later to be used. Is the use of Microsoft Project an acceptable alternate program?

Answer: Microsoft Project is not acceptable. Contractor to conform to the specification requirements.

RFC #58

Question: Per the Job Walk Agenda 6. B.1(b) states Expanded List of Subcontractors due within 24 hours of the bid submission - please clarify what is due on day of bid.

Answer: Contractor is required to submit a list of subcontractors per Bid Documents, Part 5 Bid Forms, Section 2.A, and the Subcontractor information input via the Owner's PlanetBids website. See Question 3.

RFC #59

Question: Bid Form page 1 - sates a daily rate listed above compensable delays - No daily rate is listed - does this apply?

Answer: The daily rate indicated in the Bid Documents, Part 5, Bid Forms page 1 does not apply to this section.

CLARIFICATION: DELETE the paragraph "The daily rate shown above will be the total amount of entitlement for each day of Compensable Delay caused by OWNER at any time during the performance of the Work and shall constitute payment in full for all daily delay costs, direct and indirect (including, without limitation, compensation for all extended home office overhead and extended general conditions), of the bidder and all subcontractors, suppliers, persons, and entities under or claiming through Bidder on the Project. OWNER will pay the daily rate of compensation only for the actual number of days of Compensable Delay, as defined in the Bid and Contract Documents."

RFC #60

Question: Warranty Period is 1 year from Substantial Completion (4.2.8 of GC); but GC Section 3.5 says it begins on the day the Owner files NOC - Which is correct?

Answer: Warranty Period begins on the day the Owner files Notice of Completion per General Conditions Section 3.5.

CLARIFICATION: DELETE all references to the warranty period beginning from the date of Substantial Completion (throughout all contract documents) and **REPLACE** with the warranty period beginning from the date the Owner files Notice of Completion.

RFC #61

Question: Spec in doc 2 Gen Requirements - 0100110 1.04 lists 2 allowances, no description or amount. Same with Alternates, and Unit Prices. Are there allowances in the project? They are not shown on bid form?

Answer: No Allowances, Alternates of Unit Prices are required in this contract.

RFC #62

Question: Section 01030 3.01 Project Forms lists 34 different forms that are said to be used on the project. Please provide copies of these forms.

Answer: Since the Contractor will be utilizing the Owner's PROCORE system for Construction Documentation, the forms should not be necessary. However, the forms shall be attached in this Addendum for your reference.

RFC #63

Question: GC 9.3.2 - states that stored materials billing approved only in unusual circumstances - Supply Chain issues may dictate, is owner amenable to agreeing?

Answer: Payment by the OWNER for stored material shall be made only in unusual circumstances where the Architect specifically recommends, and OWNER specifically approves, the payment in writing. The College will consider a request for payment on stored material on a case-by-case basis and only with the Architect's recommendation and subject to the terms and conditions of General Conditions Article 9.3.2.

RFC #64

Question: Irrigation legend on L2.00 mentions use of purple pipe for mainline and lateral line. However, SPECS 328400, 2.1A, 1 says that all mainline and lateral lines shall be white PVC Pipe. Please confirm which type of pipe is to be installed.

Answer: All irrigation lines are to be purple pipe. See revised specification section 32 84 00.

RFC #65

Question: Irrigation details C,E/L2.51 indicates wire sleeving is only required when under hardscape. However, SPECS 328400, 2.1F & SPECS 328400, 3.4F mentions that all control wire is to be installed in conduit. Please confirm if wire sleeving is required throughout site regardless if under hardscape or not, or only if under hardscape.

Answer: All control wiring to be installed in a conduit regardless if under hardscape or not, per Campus standard. See revised sheet L2.51

RFC #66

Question: Please indicate model and size of steel header as noted in following locations: Item #7/L1.00, Detail I/L1.51, Detail G/L3.51, SPECS 321510, 2.4.

Detail C/L3.51 shows that (2) 3"x8' Lodgepoles are to be used for tree planting. However, SPECS 329300, 2.1A shows tree planting to use (2) 3"x12' Lodgepoles. Please confirm which is correct.

Answer: Steel header: Noted in Reference Legend item #17, updated Landscape sheets. Lodgepoles: 3" x 8" lodgepoles are correct. See updated specification section 32 93 00

RFC #67

Question: Detail F/L3.51 shows a diagram that root barrier is being installed for trees that are within 5' of hardscape. However, Note A indicates that trees within 20' of hardscape is to receive root barrier. Please indicate which of the two distances should be applied for root barrier application.

Answer: See response to RFC #36

RFC #68

Question: Note 3 on Detail F/L3.51 mentions root barrier to be a minimum of 24" deep. However, SPECS 329300, 2.12C mentions that root barrier heights are either 18" or 36" deep. Please indicate what size root barrier is to be used for this project. Also, are panels acceptable for root barrier installation?

Answer: Root barrier panels are acceptable. See response to RFC #36

RFC #69

Question: SPECS 329300, 3.4D mentions the use of a sub-drainage system for trees with either a direct connection to storm drain, or to install an auger drain sump. However, Detail C/L3.51 does not indicate any use of such sub-drainage system for trees. Please confirm if a sub-drainage system is required.

Answer: Contractor shall follow plans in this instance only. No sub-drainage required.

RFC #70

Question: Please confirm if fabric is required at gravel strips for details H,I/L3.51.

Answer: Yes, please install Mirafi 600X Fabric Weed Barrier at gravel strips. No soil or weed barrier shall be visible through the gravel. See updated drawings/

RFC #71

Question: Sheet L1.01 has (2) locations with a Reference Legend Callout #11 indicating "Raised Planter". At what depths are soil (and/or drainage gravel) to be at each location?

Answer: Refer to architectural sheets, including but not limited to slab plans and detail sheets for additional information regarding required depth of soil in the raised planter areas.

RFC #72

Question: Sheet L1.01 has (2) locations with a Reference Legend Callout #16 indicating "Gravel For Interior Planters". Are these areas to only receive gravel, or are fabric and soil import required at these areas? If so, what soil depth is required?

Answer: The two interior planters are to receive gravel only. No Filter fabric or soil is required as these are depressed concrete slab areas. Refer to RFC #101 for additional information.

RFC #73

Question: Irrigation backflow on irrigation legend L2.00 calls out for a Rainbird 100-ASVF 1" Backflow. The model number seems wrong considering its to be installed in a Strongbox Enclosure. Also, legend calls out for 1" size. However, the "Pressure Calcs" on the same page indicate the use of a 2" backflow. Please confirm the correct model and size to be used for the irrigation backflow preventer.

Answer: A new irrigation backflow is NOT required (per the College) & has been eliminated from the plans and legend. Updated revised landscape sheets.

RFC #74

Question: Irrigation Master Control Valve on irrigation legend L2.00 calls out for a Rainbird 300BPE N/C 3" Master Valve. However, POC #1 Chart on L2.02 near POC location indicates MV to be a size of 2". Please confirm the correct size for the Master Control Valve.

Answer: Master Valve shall be normally-closed Rainbird Superior 2". See revised landscape sheets.

RFC #75

Question: Sleeving description on Irrigation Legend L2.00 says all sleeves to be 2x the pipe diameter or wire bundle. However, irrigation sleeve size chart provides a size depending on the pipe to be sleeved. Please clarify if pipe is to be sized per the irrigation sleeve chart, or if sleeve size is to be 2x the pipe being sleeved.

Answer: Irrigation pipe sleeving is to be sized per the "Irrigation Sleeve Sizing Chart." Control wire conduits to be sized per the "Control Wire Conduit Sizing Chart." Both found on sheets L2.01 and L2.02.

RFC #76

Question: Is sleeving required for piping and wiring that run under stabilized decomposed granite?

Answer: No sleeving is required for irrigation pipes running under stabilized DG. Per campus standard and as per response to RFC #65, all wiring to be installed in a conduit regardless if under hardscape or not.

RFC #77

Question: Irrigation Construction Note on Sheet L2.00 states that "The landscape contractor shall purchase and install one 2" reclaimed water meter located per the civil engineer's sewer & water plan and as shown on the irrigation plan." Please confirm that that the landscape contractor is in fact to supply & install the reclaimed water meter.

Answer: General Contractor is to establish scope items for each discipline.

RFC #78

Question: 13/A8.11 in the MP Room #101, on the west wall in the middle of this wall there is a square box with a question mark symbol "?" that does not have a designation assigned to it, please provide what this square box on the wall represent or clarify.

Answer: See revised sheet A8.11.

RFC #79

Question: L1.00 + L1.02 Master Construction Legend SA-9 Handrail material calls for Stainless Steel. Please provide the basis-of-bid finish of either Polished or Brushed, noting that Detail P/L1.51 only lists the Handrail as steel.

Answer: See updated Sheets L1.00 & L1.02.

RFC #80

Question: L1.51 Detail G Unit Pavers Note 7 calls for the Geotextile Separation Fabric below the 6" Aggregate Base is "optional". Confirm that the basis-of-bid is to exclude this fabric.

Answer: Confirmed.

RFC #81

Question: L1.52 Detail D calls out the Chainlink Post sizes, as does Section 323113 par. 2.01-E Schedule. Gate Detail D Notes 1 & 7 calls for 1-7/8" O.D. Top-Mid-Bottom Rails, and Note 4 Gate Post calls for 2-7/8" OD. However 2.01-E Schedule Gate Posts calls for 2-1/2 inch Nominal Pipe Size (NPS) and 6.625 inch Outside Diameter (OD), and Gate Frames calls for 1-1/2 inch NPS & 8.625 inch OD. So confirm the Gate Frame Pipe Size and conform the drawings to the specifications.

Answer: Detail updated to refer to specs, sheet attached revised detail.

RFC #82

Question: L1.52 Detail L calls out the Chainlink Post sizes, as does Section 323113 par. 2.01-E Schedule. Fence Detail L Note 2 calls for 2-7/8" Line Post, Note 3 calls for 1-5/8" Top & Bottom Rails, and Note 4 calls for 4" O.D. End Post. However 2.01-E Schedule Top Rail calls for 1-1/4 inch Nominal Pipe Size (NPS) and 2.375 inch Outside Diameter (OD), and Line Posts calls for 2 inch NPS & 4.00 inch OD, and Corner Post calls for 2-1/2 inch NPS & 4.00 inch OD. So confirm all the Fence Pipe Sizes and conform the drawings to the specifications.

Answer: See revised Landscape plans and Specification section 32 31 13.

RFC #83

Question: Section 323113 Chain Link Fence par. 2.01-E Schedule lists the Nominal Pipe Size and Outside Diameter and Weight (per LF), however all of the items mostly do not match each other. For example, Gate Frames lists the NPS as 1-1/2 inch but the OD is 8.625 inch and the Weight is 2.72 #/LF which would match the NPS but not the OD size. Please correct the Schedule so the bidders can determine the basis-of-bid for all the Chain Link Pipe sizes.

Answer: See response to RFC #82.

RFC #84

Question: L3.00 thru L3.01 Planting Legend: Trees lists quantities & for the Fern Pine (24" box) is listed as 21 each, however the L3.01 Planting Plan calls for 23 each. Confirm if the listed quantity supersedes the Planting Plans as the basis-of-bid, or if the plans supersede the listed quantity.

Answer: See revised landscape sheets showing revised quantity which shall be basis-of-bid.

RFC #85

Question: L3.00 thru L3.01 Planting Legend: Shrubs & Vine lists quantities & spacing for each size. The Planting Plans show a symbol for each plant type. Noting that 12 of the 24 plants have different quantities of symbols versus List Qty on the Legend, so confirm if the basis-of-bid is to be the listed Quantity on the Planting Legend, or the Spacing as listed on the Planting Legend, or the Symbols shown on the Planting Plans.

Answer: See response to RFC #83 above.

RFC #86

Question: L3.00 thru L3.01 Planting Legend: Gravel lists the Blasted Granite Boulders Total Qty as 12, but lists 3@ 3' long + 3@ 4' long + 3@ 5' long for a total of 9 each. A review of the L3.01 & L3.02 drawings shows 9 each, and on A2.21 there are 3 inside the building near the Toilet Rooms. So confirm that the basis-of-bid is to be 9 each or 12 each, and if 12 is required provide the size of the remaining 3 boulders.

Answer: See revised Landscape sheets which have been updated with revised boulder quantities.

RFC #87

Question: L3.51 Detail I Gravel Maintenance Strip does not show any geotextile separation fabric below the Note 1 Gravel. Confirm that the bidders are not to include any fabric, or if required provide the material mfr & product.

Answer: See response to RFC #70.

RFC #88

Question: C9.00 Detail 2 calls for 4" Aggregate Base at the Heavy Duty Concrete Pavement, and Detail 3 calls for 12" Class 2 Aggregate Base at the Fire Access Road Section. Confirm if Crushed Miscellaneous Base is acceptable, or if Crushed Aggregate Base is required.

Answer: Per the project Geotechnical Report: "Class 2 aggregate base materials should conform to Section 26-1.02A of the "*Standard Specifications of the State of California, Department of Transportation"* (Caltrans). The use of Crushed Miscellaneous Base in lieu of Class 2 aggregate base is acceptable. Crushed Miscellaneous Base should conform to Section 200-2.4 of the "*Standard Specifications for Public Works Construction"* (Green Book)."

RFC #89

Question: Will the Audio Visual Systems be a part of this construction project, or, will it be OFOI?

Answer: See response to RFC #10 above.

RFC #90
Question: 055000 par. 2.05-F Safety Stair Nosings is specified as "at pre-cast stairs and landings", however the Stair Treads & Landings are site cast. Confirm that the Safety Stair Nosings models as listed are still acceptable for this condition.

Answer: See revised specification section 05 50 00.

RFC #91
Question: C4.00 Fire Hydrant is tagged 20 but should be 21 instead.

Answer: See revised sheet C4.00

RFC #92
Question: Details F & G/L2.51 and specification 32 84 00-2.1.F.4 - Plans do not have any notes for a 2 wire system. However the details are showing decoders. Please confirm that this is not a 2 wire system.

Answer: The irrigation is a conventional system, not a 2-wire system. See revised sheet L2.51.

RFC #93
Question: There is a specification 11 52 13 Projection Screen which is CF-CI, however keynote 11.52 on interior elevations A8.11, A8.12 & A8.52 & RCP A3.11A indicate projection screen to be OF-OI. Are projection screens CF-CI or OF-OI?

Answer: Projection screens in classrooms and Large Group Study are OFOI as indicated on drawings. See response to RFI #10 for additional information regarding projection screen in Room 101.

RFC #94
Question: Projection Screen specification 11 52 13 - 4 indicates it is only in room #101 (MP Room) however there are other locations that have projection screens (such as typical classrooms reference A8.11, A8.12 & A8.52). Please confirm projection screens are required at locations shown on the drawings and not just only in MP room #101.

Answer: See responses to RFI #10 & 93.

RFC #95
Question: FP0.1A calls for an 8" FW pipe between "HYD" and "U8" nodes, however C4.00 calls for this same pipe to be 10" FW, so confirm which size is the basis-of-bid. Also, the pipe lengths on this sheet are different than shown on C4.00, so please provide direction.

Answer: Pipe lengths and sizes shall be per sheet C4.00. Note that lengths of pipe shown on sheet C4.00 are approximations only, and may need to be adjusted, at no cost to owner based on the contractor's actual installation layout.

RFC #96

Question: Note A on E/L1.53 indicates a full scale mockup of the concrete bench. Please confirm this full scale mockup can be part of the permanent construction (as indicated on specification 32 13 13 paragraph C.2) and not a separate standalone full scale mockup.

Answer: Full scale mock-up, if approved, may remain part of the permanent construction.

RFC #97

Question: Wall and Site Amenities Legends W-1, W-5, & SA-2 indicate "12x12 cube mockup..". (A) please confirm this is 12" inch x 12" inch (not 12' feet x 12' feet)? (B) also please confirm this can be be part of the permanent construction (as indicated on specification 32 13 13 paragraph C.2).

Answer: Mock-ups indicated on W-1, W-5, & SA-2 are to be 12" x 12" cube mock-ups and are not part of the construction. Full scale mock-ups, if approved may remain part of the permanent construction.

RFC #98

Question: Reference Plaster Specification 09 24 00 paragraph 1.05.C Mockups, please confirm this can be incorporated into the completed work and not a separate standalone plaster mockup.

Answer: Mock-ups, if approved, can be incorporated into the complete work.

RFC #99

Question: M0.03 Mechanical AHU Schedule RTU calls for Notes 1,2,5,9 that need to be provided.

Answer: Contractor shall disregard the notes column on the RTU schedule, as they are not applicable. Contractor shall also disregard the "MECHANCAL – AHU SCHEDULE ENERGY RECOVER WHEEL" schedule as it is not applicable to this project.

RFC #100

Question: Self-adhered sheet waterproofing is shown as a dotted line spanning underneath the entire building slab on 1/A6.11. Please confirm that a vapor barrier is to be placed below the slab over 4" compacted sand, not waterproofing.

Answer: This is Vapor Barrier per Specs. See revised sheets A6.11, A6.12, & A6.13

RFC #101

Question: L1.01 Reference Legend 16 Gravel for Interior Planters refers to Planting Legend & Architectural Details. However, L3.00 refers to Details G,H/L3.51 which shows the exterior 2" thick Gravel Strips that appears to be for L1.01 Reference Legend 22 instead. Per A2.13A the area below the Toilet Room is a "dark shade" that the Legends represent as 6" slab depression, so confirm that thickness of the Gravel fill of either 6" or 2" thick.

Answer: Rock gardens shown inside the building shall be filled with rocks/gravel with a depth sufficient to fill the depressed slab.

RFC #102

Question: A2.13A the area below the Toilet Room is a "dark shade" that the Legends represent as 6" slab depression and A2.14A Lobby shows a CT2 floor finish, so provide a detail for the edge at this 6" slab depression for the Ceramic Tile edge.

Answer: Exposed Concrete/Tile floor transition shall be per 1/A10.63.

RFC #103

Question: A10.16 Detail 18 shows a Flexible Weather Barrier & similarly Detail 14/A10.15 shows a Silicone Flexible Air Membrane. Please provide the mfr. & product for these flexible barriers/membranes.

Answer: See specification section 07 27 26

RFC #104

Question: A4.11A Roof Plan at Grids ZB & Z2 is a detail callout for 11/A10.16 for the horizontal 2" Joint Cover. Provide the length of this horizontal Joint Cover as it is difficult to determine exactly where this Joint Cover starts & stops, and provide the detail for each ending condition.

Answer: The horizontal roof joint cover runs continuously around perimeter of roof parapet per details 1/A10.16 and 11/A10.16. Refer to structural drawings S6.00 through S6.03 for location and length of drift joints. Horizontal roof joint terminates at vertical joint at curtain wall locations per 16/A10.16. See revised sheets A10.16

RFC #105

Question: A4.11A & A4.11B along Grids 9 & A & 3 alternates between Detail 1/A10.16 which calls for a 2" horizontal Joint Cover and Detail 6/A10.16 which does not & Detail 24/A10.44 which shows a horizontal Drift Joint. Confirm the location of the 2" horizontal Joint Covers and where they start & stop at each location(s).

Answer: See response to RFC #104

RFC #106

Question: 076200 par. 3.03-S specifies 099000 High Performance (Special Coatings) for the galvanized sheet metal plaster reveals. Confirm that this paragraph is to be deleted since this does not apply for this project.

Answer: Confirmed. See revised specification section 07 62 00.

RFC #107

Question: 076200 par. 3.04-A specifies 099000 High Performance (Special Coatings) for the "exposed metal flashings" then lists "Parapet Coping" for three conditions, and . Confirm which of these paragraphs are to be the basis-of-bid and which are to be deleted.

Answer: Specification section 07 62 00, paragraph 3.04A lists 3 different conditions, all of which are applicable to the project, and part of the construction.

RFC #108

Question: The DHE-1 water heater is a residential heater which has ¾" inlet and outlet for the cold and hot water. The drawings show 1" cold water coming in and 1-1/2" hot water coming out. Please confirm this water heater be sufficient for the project being that it is residential, not commercial.

Answer: Reduce the inlet and outlet piping at the heater connection, a larger commercial unit requires much larger installation space, and it will provide a much larger recovery rates than what is needed for this building.

RFC #109

Question: There are RD/OD's on the roof (roof drains and overflow drains) but these fixtures are not called out on the fixture schedule. Please specify a make/model of drains you would like us to use or confirm if any standard model is sufficient such as the JR smith 1010Y and 1080Y.

Answer: Provide Combination Roof Drain and Overflow Drain model Jay R. Smith 1850

RFC #110

Question: Condensate drains on this project are called out for L copper. Please confirm Type L is desired for condensate drainage piping vs standard Type M copper.

Answer: The use of copper pipe type L is acceptable for condensate drainage systems.

RFC #111

Question: Storm piping is being called out to be insulated for drain bodies and 10 feet back. Please confirm this requirement. This is more of an east code spec and not typically required in California.

Answer: The insulation of the drain bodies and 10 feet of piping may be eliminated

RFC #112

Question: 20/A10.51 shows a ¾" x 2" SS plate at handrail attachment. Please confirm that this plate is not at full height like the 2-1/2"x1/2" sstl upright plates (posts) and this ¾" x 2" sstl plate is where the ½" x 2" stainless steel handrail bracket is welded to.

Answer: Correct.

RFC #113
Question: Please provide locations of roof pipe supports on sheet P4.11 and give a detail specifying which supports are desired.

Answer: Use pipe stands per section 22 05 29-2.07

RFC #114
Question: There is a detail 4/A10.91, 4" seismic joint at plaster and we are unable to locate where this detail occurs, please clarify where on the exterior elevation drawing (or roof plan or building section plan, etc..) this detail apply, which sheet is it on? or is this detail not applicable to the project?

Answer: This detail is not applicable to this project.

RFC #115
Question: Please provide forms and requirements for substitutions.

Answer: See answer to RFC#15. Bidders are not prohibited from proposing substitutions during bid but do so at their own risk. See attached Project forms for the Substitution request form.

RFC #116
Question: 321510 par. 2.4 does not specify the Steel Edging size, and L1.51 Detail I Note 2 does not specify the DG Edging size (Note 4 calls for 18" Aluminum Stakes), and L3.51 Detail G Note 1 does not specify the Steel Header (Note 3 calls for Steel Stakes). Please provide the model & size of the Header and the material & size for the Stakes.

Answer: See response to RFC #66.

RFC #117
Question: 328400 par. 2.1-A-1 specifies that all pipe shall be white PVC Pipe, however L2.00 Irrigation Legend for Reclaimed Water Mainline & Lateral Line & PVC Sleeves call for purple pipe. Please confirm which type of pipe is to be installed.

Answer: See response to RCF #64

RFC #118
Question: 329300 par. 3.4-D specifies the use of a sub-drainage system for trees and for bidders to "connect to civil storm drain where ever possible", or "if not possible connect to drain sump" of "six inch diameter auger a minimum of six feet below bottom of plant pit with four inch diameter perforated PVC and filter fabric sock...." However, Detail C/L3.51 does not indicate any use of such sub-drainage system for trees. Please confirm if a sub-drainage system is required or connection to the nearest Storm Drainage, and if so provide a basis-of-design for the bidders to price.

Answer: See response to RFC #69

RFC #119
Question: L1.01 Reference Legend 11 Raised Planter per 10.14 & 10.17 is called out at 2 locations. Provide the soil and/or drainage gravel depths at each of these locations.

Answer: See response to RFC #71

RFC #120
Question: L1.01 Reference Legend 16 Gravel For Interior Planters is called out at 2 locations that appear to receive only gravel. Confirm if Filter Fabric and/or Soil is required at either of these areas, and provide a section with dimensions for each of the materials.

Answer: No Filter fabric or soil is required as these are depressed concrete slab areas. Refer to RFC #101 for additional information

RFC #121
Question: L2.00 Irrigation Legend Backflow calls for a Rainbird 100-ASVF 1" Backflow Preventer to be installed in a Strong Box SBBC-45SS enclosure, and the Pressure Calculations for Domesic Irrigation shows a 2" Backflow RP, so confirm the correct model and size to be used for the Irrigation Backflow Preventer.

Answer: See response to RFC #73.

RFC #122
Question: L2.00 Irrigation Legend Master Control Valve calls for a Rainbird 300BPE Normally-Closed 3" Master Valve, however, L2.02 POC #1 Chart calls for the MV to be 2" instead. Confirm the Master Control Valve basis-of-bid size.

Answer: See response to RFC #74

RFC #123
Question: L2.00 Irrigation Legend for PVC Sleeves description says "Size to be two times the pipe diameter or wire bundle", however the Irrigation Sleeve Size Chart provides a size depending for each pipe size. Please clarify if the sleeves are to be sized per the L2.01 & L2.02 Irrigation Sleeve Sizing Chart, or to be 2x the pipe being sleeved.

Answer: See response to RFC #75

RFC #124
Question: L2.00 Irrigation Construction Note 1 POC Note states that "The landscape contractor shall purchase and install one 2" reclaimed water meter located per the civil engineer's sewer & water plan and as shown on the irrigation plan." Please confirm that that the bidders are to supply & install the Reclaimed Water Meter, or if this will be OFOI instead.

Answer: See response to #77

RFC #125
Question: L2.01 does not show any PVC Sleeves for irrigation piping and wiring that run under the stabilized Decomposed Granite, confirm that this is correct.

Answer: Duplicate, see response to #76

RFC #126
Question: L2.51 Details C, E Irrigation indicates wire sleeving is only required when under hardscape, however 328400 par. 2.1-F & par. 3.4-F-2 specifies that the control wire is installed in conduit. Confirm that the Wire Sleeving is required only under hardscape (or where specifically called out on L2.01 & L2.02 with the Legend 'double dashes') and that the specifications calling for conduit at all locations is to be deleted (except under hardscape).

Answer: See response to #65

RFC #127
Question: L3.51 Detail B Note 1 calls for (2) 2" dia. x 8' long Lodgepole Stakes & Detail C Note 1 calls for (2) 3" dia. x 8' Lodgepole Tree Stakes, however 329300 par. 2.10-A specifies tree planting to use three 3"x12' Wood Stakes. Please confirm the basis-of-bid for the Tree Stake quantity, diameter & length.

Answer: See response to #66

RFC #128
Question: L3.51 Detail F shows a diagram that Root Barrier is being installed for trees that are within 5' of hardscape, however Note A calls for Root Barriers for trees within 20' of hardscape. Provide the basis-of-bid dimension.

Answer: See response to #36

RFC #129
Question: Please confirm that bidders are to include a domestic water sub meter per spec 22 05 19 section 2.01 and specify location.

Answer: Domestic Water sub meter is required – location to be coordinated with the Owner at start of construction.

RFC #130
Question: Please confirm that any specified & listed manufacturer is acceptable to use, regardless of whether or not it is the basis of design.

Answer: See response to RFC #15.

RFC #131

Question: Please provide specifications for the commissioning and testing of building plumbing systems.

Answer: See new specification sections 22 08 00 Commissioning of Plumbing, and 26 08 00 Commissioning of Electrical Systems.

RFC #132

Question: Spec 23 31 13 Section 3.13, Please confirm that Duct Cleaning is not required for all new ducts if duct cleanliness test from section 3.14 is passed.

Answer: See response to RFC #1 above.

RFC #133

Question: Drawing T301 note 4: 6—strand Sumitomo Air-Blown Interbuilding Singlemode OS2 and 6-strad Sumitomo Air-Blown Interbuilding Multimode OM4 to BDF in Main Instructional Building. Where is the BDF located within the Main Instructional Building and what is the conduit pathway continuation from vault (CMH-5) on sheet T100?

Answer: The Contractor shall connect to the existing Main Instructional Building BDF in RM 128 through existing pathway. Refer to sheet EC1.02 of the as-built package for the Chaffey Chino Main Instructional Building, for this complete existing pathway.

RFC #134

Question: L3.51 Detail F & 329300 par. 2.12-D Root Barriers specified as linear, so confirm that panels acceptable for root barrier installation.

Answer: See response to RFC #68.

RFC #135

Question: Sheathing type shown in Table A of plan A10.11 has a designation for gypsum board with lead (D,E,F,G,H,J). Wall schedule listed has not shown any, please confirmed if this is not used.

Answer: Table A shows all sheathing types, some of which are not applicable on this project. See "WALL SCHEDULE" table on 1/A10.11, and "DIMENSION & WALL TYPES" sheets for walls used on the project.

RFC #136

Question: The Sheet C3.00, Keynote #7 shows reference detail 2 on Sheet C9.00 for the Fire Access Road. Please confirm that the reference detail for the Fire Access Road is detail 3 on Sheet C9.00, not the detail 2 on Sheet C9.00

Answer: Detail reference for Fire Access Road should be detail 3 / C9.00. See revised sheets

RFC #137
Question: Please provide specification for the Concrete Reinforcement.

Answer: There is no dedicated specification for concrete reinforcement. Project requirements are found in Specification Section 03 30 00 and S0.01, "REINFORCING STEEL."

RFC #138
Question: The Sheet L1.01 shows installation of Precast Tables & Chairs on the Unit Pavers Area. But, the reference details B & E on Sheet L1.54 shows installation details on the PCC Concrete Pavement Area. Is there any Concrete Pad required for Precast Tables & Chairs, under the Unit Pavers. If yes, please provide details.

Answer: No, the Precast furniture does not require mounting for security. Attachment shown on L1.54 can be disregarded.

RFC #139
Question: The detail F on Sheet L1.52 and detail E on Sheet L.53 shows Skate Deterrent per detail G on Sheet L1.53. But, there is no detail G provided on the Sheet L1.53. Please confirm that the reference detail for Skate Detterent is detail L on Sheet L1.53.

Answer: Sheets L1.52 and L1.53 are clouded to indicate revised reference to L/L1.53.

RFC #140
Question: Details 16 & 17/ A10.31 shows sprayed fireproofing requirement. Please provided Specification and exact location/ description where the applications occurs.

Answer: See response to RFC #49 above.

RFC #141
Question: The coping per detail 3,8/A10.17 calls for Stainless steel coping PTD, EP3. Please clarify if the coping shall be stainless steel or painted finish.

Answer: See revised sheet A10.17.

RFC #142
Question: Under spec section 102800, para 2.02.A, says" Refer to specific products below for indication of Owner-furnished, Contractor-Installed,(OFCI) or Owner-Furnished, Owner-Installed (OFOI) products. Going through the listed accessories, none is said to be either or. Please confirm that all toilet accessories will be supplied & insrtall by contractor. Otherwise please clarify which Toilet Accessories will be OFCI &/ or OFOI.

Answer: All items listed in specification section 10 28 00 shall be CFCI.

RFC #143

Question: The DHE-1 water heater is a residential heater which has ¾" inlet and outlet for the cold and hot water. The drawings show 1" cold water coming in and 1-1/2" hot water coming out. Will this water heater be sufficient for the project? It's residential, not commercial.

Answer: See response to RFC #108

RFC #144

Question: There are RD/OD's on the roof (roof drains and overflow drains) but these fixtures are not called out on the fixture schedule. Do you have a make/model of drains you would like us to use or just something standard such as the JR smith 1010Y and 1080Y ?

Answer: See response to RFC #109

RFC #145

Question: Condensates on this project are called out for L-Copper lines. Is type L-Copper the required pipe or we can use the standard M copper?

Answer: See response to RFC#110

RFC #146

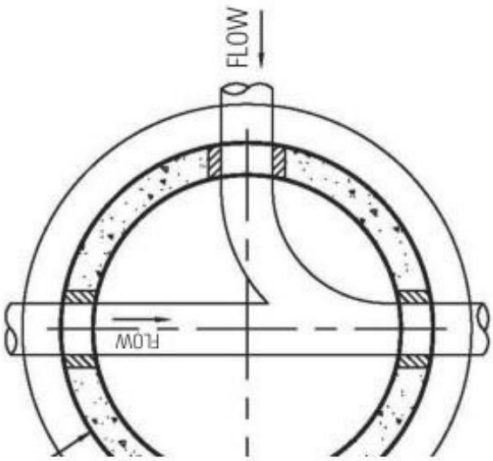
Question: Storm piping is being called out to be insulated for drain bodies and 10 feet back. Is this necessary? This is more of an east code spec and not required in California.

Answer: See response to RFC #111

RFC #147

Question: On sheet C4.00 construction note #11. Please confirm that this is a sewer manhole,and that it is an existing manhole. And if it is existing, does it have a stub out for us to connect to. And if it does not have a stub out, please provide a detail on how to re-channel the manhole.

Answer: Sewer manholes on C4.00 should be called out with construction note 10. The sewer manhole at the south end of the project on the existing sewer line is an existing manhole and does not have a stub out. Create new, smooth channel in manhole base that connects flows from the north to existing west-east channel and discharges east as shown below.



RFC #148
Question: Please confirm that the 60-inch HDPE is only for water retention.

Answer: The 60-inch HDPE pipe is only for storm water retention.

RFC #149
Question: Please confirm that the pipe bedding for the Sewer, Storm Drain and Water is per trench detail #4 on sheet C4.00

Answer: Pipe bedding for Sewer, Strom Drain, and Water is per detail 4 / sheet C9.00.

RFC #150
Question: On sheet C4.00 construction note #1 Water line (PVC C-900 CL-200). The domestic water line has a section of pipe that is only three inches, the C-900 pipe starts at four inches therefore this will not work for this section. Can we use a PVC SCH-40 / 80? Please clarify

Answer: Utilize schedule 80 PVC for 3" domestic water line.

RFC #151
Question: There are Audio Video Plans issued as part of the documents but no Specification. Please provide Specs for the Audio Video System

Answer: See response to RFC #10 above.

RFC #152
Question: The detail 2 on the drawing S7.02 shows 6" Slab on Grade at the Sloping Conc Wall. But, the detail 5 on the drawing S8.00 shows 5" Slab on Grade. Please clarify which is correct?

Answer: Use 5" thick slab.

RFC #153

Question: The Construction note #21 on the drawing C4.00 shows Fire Hydrant. Please provide New Fire Hydrant Location on the Plan.

Answer: New fire hydrant is located near the southwest building corner.

RFC #154

Question: The Construction note #13 on the drawing C4.00 shows 6" wide Trench Drain. Please provide the Manufacturer Information & Installation Details.

Answer: Contractor to select make/model of 6" trench drain as available from contractor's supplier. Manufacturer to supply installation details.

RFC #155

Question: The Construction note #25 on the drawing C4.00 shows Storm Drain Outlet. Please indicate exact location on the Plans.

Answer: Construction note 25 is not used.

RFC #156

Question: Keynote #08.91, refers to wall louver vent shown on detail 10/A5.13. and 1/A7.51. Please provide a specs for Louver Vents.

Answer: See Louver Schedule on M0.03 for louver requirements

RFC #157

Question: Dwg Sheet E5.10 Detail 3, Note #8 calls for #4 Rebar @ 16" o.c. for the entire ductbank length, of about 1000 feet long. This seems to be unusual, but please confirm that this reinforcement bar is required.

Answer: No reinforcement bar required for (2)4" C. Note that spacers are required.

RFC #158

Question: Dwg Sheet E5.01 Detail 1 and 2, Note A & D mentioned that the Door height must be 8'. However, on Door Schedule Sheet A9.11, these doors (106-A & 206-A) are shown as 7' height. Please clarify.

Answer: See revised architectural plans showing revised door heights.

RFC #159

Question: Keynote #9 on C3.00, says Rain Garden per Landscape plans, but per landscape plans L1.02, no details were showns. Please clarify.

Answer: Rain Gardens refer to the planted area. Contractors shall refer to Civil plans for elevations of Finish Grade of at the Rain Gardens, and Landscape drawings for Planting/irrigation. No additional detailing is required.

RFC #160

Question: Sheet M2.21B, Column Line ZB and Column Line #3 show a 32" X 24" RA from below. Sheet M2.11B same column lines from the 2nd floor, show no RA ductwork. Please advise.

Answer: The return duct would be above AV/ TV 115G room. The return duct intake is showing on sheet M2.21 between grid "E" and "ZB" and below "3".

RFC #161

Question: Spread Footing Schedule on S3.01 indicates that F1, F2, F4, F5 and F6 have a depth of 18" but Sheet S0.01 Foundations note #2 states that, "footing dimensions shall not be less than 24" for isolated spread footings" Please indicate if footing will need to be 18" or 24"?

Answer: Use the scheduled thickness.

RFC #162

Question: Please confirm general conditions section 8.4.2 states "The Contractor shall not be liable for actual damages," can be revised to "The Contractor shall not be liable for actual and liquidated damages."

Answer: Article will not be revised. Article 8.4.2 will remain as-is.

RFC #163

Question: GC section 8.4.3 allows for excusable delay for delays "only occurring at or in the immediate vicinity of the site…" Please confirm that the district will allow for excusable delays for delays outside the immediate vicinity of the site.

Answer: Not confirmed. Article 8.4.3 will remain as-is.

RFC #164

Question: Please confirm GC Section 8.4.3 can be revised to include delays outside of the General Contractor's control for items such as pandemics, epidemics, acts of governmental authority, protest, riots, insurrection, war, flood, etc

Answer: Article will not be revised. Article 8.4.3 will remain as-is.

RFC #165

Question: Would the district consider including a waiver of consequential damages?

Answer: No. The OWNER will not consider a waiver of consequential damages.

RFC #166

Question: The notice inviting bids states that "Bidders shall comply with all local, state and federal requirements and best practices associated with the COVID-19 pandemic" and that the "costs of adhering to and complying with such COVID-19 safety measures shall be the responsibility of each Bidder and shall be included and incorporated into their respective bids. Please confirm that these costs are limited with current state and federal requirements and bidders are not required to carry costs for any future changes in these requirements.

Answer: The District does not control state and federal COVID -19 guidance and mandates, and the Bidder shall be responsible to carry all current and future costs for any changes in state and federal requirements as the pandemic evolves.

RFC #167

Question: Will District please provide a copy of the District's Builder's Risk policy for our review?

Answer: The District will provide a copy of the Builder's Risk policy to the lowest responsive, responsible bidder upon request.

RFC #168

Question: Will district include a mutual waiver of subrogation (WOS) that applies as between Owner, Contractor and Subcontractors of all tiers under the Owner's BR policy?

Answer: No, the district will NOT include a mutual waiver of subrogation.

RFC #169

Question: Please confirm the district's builder's risk policy will include Contractor and Subcontractors of all tiers to be included as additional insured (AI) under the Owner's Builder's Risk (BR) policy.

Answer: The District's Builder's Risk policy is for the benefit of the District. Contractors and Subcontractors will NOT be included as additional insured.

RFC #170

Question: Please confirm if Johns Manville can be added as an equal and acceptable manufacturer in the 07 55 00 - Modified Bituminous Membrane Roofing Specification.

Answer: See response to RFC#15 above

RFC #171

Question: Specifications - Section 27 15 00 (Communications Horizontal Cable) show CommScope Category 6 cable. Please confirm CommScope Uniprise is approved for this project.

Answer: CommScope is the Chaffey Community College District standard.

RFC #172

Question: CCTV symbols are shown in the legend on SE-C1 but no cameras are shown throughout the security plans. Please verify there are no cameras to be installed.

Answer: CCTV devices shall be OFOI. Contractors shall refer to Telecom drawings for required infrastructure for OFOI cameras which shall be CFCI.

RFC #173

Question: Per Section 051200 para 1.06. A & B. under Quality Assurance requirement, that the Plant & Erector must be an AISC Certified. Please confirm that this requirement can be waived and an LA City Certified Fabricator is acceptable to perform the fabrication in accordance with AISC Guidelines & Codes.

Answer: See response to RFC#21 above

RFC #174

Question: Per General Condition Article 10.1.1 -Safety/ Contractor Responsibility, states " Each Contractor shall designate a responsible member of its organization (who is not one of the required full-time staff listed in section 3.3.2) whos sole duties shall include loss and accident prevention, and who shall have the responsibility and full authority to enforce the program". Please clarify if the Safety Official can be the same as the Site Superintended or any one of the GC's Project Management Staff doing other task for the project.

Answer: Safety Official cannot be one of the required full-time staff listed in section 3.3.2. The Safety Official cannot be the Superintendent, Assistant Superintendent, Project Administrator or either of the two Project Engineers.

RFC #175

Question: Per General Condition Article 3.3.2 - Staff. Please confirm if a full-time Project Manager is not required for the project, as the article did not mentioned as one of the required full-time personnel for the project.

Answer: All other positions not listed as required full-time positions in Article 3.2.2 can be made or scheduled at the Contractor's discretion based on their own means and methods; However, Contractor must meet the contract requirements for adequate supervision and force of workers to complete the project per the contract.

RFC #176

Question: Spec sections 05 31 00 1.03B, 22 11 23 1.04B and 23 33 00 1.03B are asking for LEED submittals. Please confirm that there are no LEED requirements for this project.

Answer: This is not a LEED project. Contractors may disregard LEED requirements from listed sections. See revised specification sections

RFC #177

Question: Par 2.8.A in Spec Section 08710 states "Owner will order and supply permanent cylinders/cores. Owner will install permanent cylinders/cores." Yet the permanent cylinders/cores are included in the hardware groups. Please advise if we are to supply and/or install the permanent cylinders/cores for this project

Answer: Contractor shall furnish and install permanent cylinders/cores in coordination with the Owner's locksmith.

RFC #178

Question: Paragraphs 2.03 A and B in Spec Section 081416 contradict each other. Either you have a metal vision lite (paragraph A) or a wood vision lite (paragraph) but you can't have both. Please clarify.

Answer: See revised specification section 08 14 16.

ITEM 2 CLARIFICATION: BID DOCUMENTS

CONTRACT APPENDIX, SUBPART C, SPECIAL CONDITIONS: SOLE SOURCE RESOLUTION FOR SIEMENS BUILDING TECHNOLOGIES, indicates products/brands and/or services for all low voltage systems." Low voltage systems for the Chino Instructional Building means Fire Alarm system and Security/Access Control System.

ITEM 3 UPDATES TO SPECIFICATIONS SECTIONS AND DRAWINGS:

REPLACE: Revised/added specifications and drawings sheets dated February 11, 2022, are hereby issued to replace those dated August 5, 2021. Contractor is to replace each referenced section and drawing sheets in its entirety with the attached TOC and modified specifications sections and drawing sheets (SEE ENCLOSURE #3). Contractor to also add the new specifications as referenced in the TOC. References to individual changes in the narrative below are for reference only, the Contractor is to conform with all provisions in the new and modified specifications.

END OF ADDENDUM NO. 2

Enclosures:

1. Chaffey Measure P Project Forms All Forms per Division 1 Section 01030, 3.01
2. HMC Addendum 2 Narrative, Table of Contents and List of Documents
3. HMC Documents
   - Revised Table of Contents
   - (25) Revised Spec Sections
   - (3) New Spec Sections (22 08 00, 26 08 00, 26 11 16.12)
   - PLAN SHEETS (44) Revised Sheets

APPLICATION AND CERTIFICATION FOR PAYMENT

TO: Chaffey College
5885 Haven Avenue
Rancho Cucamonga, CA 91737

PROJECT:
5885 Haven Avenue
Rancho Cucamonga, CA 91737

FROM:

ARCHITECT:

APPLICATION NO.:

PERIOD ENDING:

PROJECT NO.:

CONTRACT DATE:

Distribution to:
- ☑ OWNER
- ☑ ARCHITECT
- ☑ CONTRACTOR
- ☑ PROJECT INSPECTOR
- ☐ OTHER:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
CONTINUATION SHEET is attached.

SEE ATTACHED SWORN STATEMENT FROM CONTRACTOR TO OWNER

1. ORIGINAL CONTRACT SUM		$ -
2. Net change by Change Orders		$ -
3. CONTRACT SUM TO DATE (Line 1 ± 2)		$ -
4. TOTAL COMPLETED & STORED TO DATE (Column G on Continuation Sheet)		$ -
5. RETAINAGE:		
a. 10 % of Completed Work (Column D + E on Continuation Sheet)	$ -	
b. 10 % of Stored Material (Column F on Continuation Sheet)	$ -	
Total Retainage (Lines 5a + 5b or Total in Column J of Continuation Sheet)		$ -
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)		$ -
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)		
8. CURRENT PAYMENT DUE		$ -
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)		$ -

VP		GL #	
		PO#	
PM		Voucher #	
		Amount	
Proj. Ctrl.		Date	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.
CONTRACTOR:

By: _____ Date: _____

State of California
County of
Subscribed and sworn to before me this day of
Notary Public:
My Commission expires:

PROJECT INSPECTOR'S CERTIFICATE FOR PAYMENT

The undersigned Inspector verifies that the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and is entitled to payment of this Work.
INSPECTOR:

By: _____ Date: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED . . . . . $ -

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)
ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project:

APPLICATION NO.:
APPLICATION DATE:
PERIOD ENDING:
PROJECT NO.:

A	B	C	D	E	F	G	H	I	J
ITEM NO.	DESCRIPTION OF WORK	CONTRACT VALUE	WORK COMPLETED FROM PREVIOUS APPLICATION (D+E)	WORK COMPLETED THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% COMPLETED (G÷C)	BALANCE TO FINISH (C-G)	RETAINAGE
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CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project:

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CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project: ______

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CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project: ____________________

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Form "R"

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project:

APPLICATION NO.:
APPLICATION DATE:
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PROJECT NO.:

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Form "R"

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project: ____________________

APPLICATION NO.:
APPLICATION DATE:
PERIOD ENDING:
PROJECT NO.:

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CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project: ____________

APPLICATION NO.:
APPLICATION DATE:
PERIOD ENDING:
PROJECT NO.:

A	B	C	D	E	F	G	H	I	J
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	CONTRACT VALUE	FROM PREVIOUS APPLICATION (D+E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% COMPLETED (G÷C)	BALANCE TO FINISH (C-G)	RETAINAGE
	ORIGINAL CONTRACT								
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Form "R"

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project:

APPLICATION NO.:
APPLICATION DATE:
PERIOD ENDING:
PROJECT NO.:

A	B	C	D	E	F	G	H	I	J
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	CONTRACT VALUE	FROM PREVIOUS APPLICATIO N (D+E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% COMPLETED (G÷C)	BALANCE TO FINISH (C-G)	RETAINAGE
	ORIGINAL CONTRACT								
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	Sub-Total 8	$ -	$ -	$ -	$ -	$ -		$ -	$ -

Form "R"

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project:

APPLICATION NO.:
APPLICATION DATE:
PERIOD ENDING:
PROJECT NO.:

A	B	C	D	E	F	G	H	I	J
			WORK COMPLETED		MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% COMPLETED (G÷C)	BALANCE TO FINISH (C-G)	RETAINAGE
ITEM NO.	DESCRIPTION OF WORK	CONTRACT VALUE	FROM PREVIOUS APPLICATION (D+E)	THIS PERIOD					
	ORIGINAL CONTRACT								
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	Sub-Total 3	$ -	$ -	$ -	$ -	$ -		$ -	$ -
	Sub-Total 4	$ -	$ -	$ -	$ -	$ -		$ -	$ -
	Sub-Total 5	$ -	$ -	$ -	$ -	$ -		$ -	$ -
	Sub-Total 6	$ -	$ -	$ -	$ -	$ -		$ -	$ -
	Sub-Total 7	$ -	$ -	$ -	$ -	$ -		$ -	$ -
	Sub-Total 8	$ -	$ -	$ -	$ -	$ -		$ -	$ -
	Sub-Total 9	$ -	$ -	$ -	$ -	$ -		$ -	$ -
	Grand Total	$ -	$ -	$ -	$ -	$ -		$ -	$ -

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project: ______________________

APPLICATION NO.:
APPLICATION DATE:
PERIOD ENDING:
PROJECT NO.:

A	B	C	D	E	F	G	H	I	J
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	CONTRACT VALUE	FROM PREVIOUS APPLICATION (D+E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% COMPLETED (G÷C)	BALANCE TO FINISH (C-G)	RETAINAGE
	Change Order								
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FORM "S"

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project: ______________________________

APPLICATION NO.:
APPLICATION DATE:
PERIOD ENDING:
PROJECT NO.:

A	B	C	D	E	F	G	H	I	J
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	CONTRACT VALUE	FROM PREVIOUS APPLICATION (D+E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% COMPLETED (G÷C)	BALANCE TO FINISH (C-G)	RETAINAGE
	Change Order								
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CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT (cont'd)
Contractor's signed certification is attached.

Project: ______________________________

APPLICATION NO.:
APPLICATION DATE:
PERIOD ENDING:
PROJECT NO.:

A	B	C	D	E	F	G	H	I	J
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	CONTRACT VALUE	FROM PREVIOUS APPLICATIO N (D+E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% COMPLETED (G÷C)	BALANCE TO FINISH (C-G)	RETAINAGE
	Change Order								
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	Sub-Total 2	$ -	$ -	$ -	$ -	$ -		$ -	$ -
	Sub-Total 3	$ -	$ -	$ -	$ -	$ -		$ -	$ -
	Grand Total	$ -	$ -	$ -	$ -	$ -		$ -	$ -

FORM "S"

Chaffey College	**Certificate of Substantial Completion/Certificate of Partial Substantial Completion** **Construction Process**	**Bid No.** **2022PW01**

Project: Chino Instructional Building **Date:**

Architect/Engineer: **Contract No.**

Project Manager: **Contractor:**

(Check Applicable Box)

☐ **CERTIFICATE OF SUBSTANTIAL COMPLETION:**

Contract Completion Date: _____
Substantial Completion Date: _____
Intended Occupancy Date: _____
Project or Specified Area Shall Include: _____

☐ **CERTIFICATE OF PARTIAL SUBSTANTIAL COMPLETION:**

Contract Completion Date: _____
Substantial Completion Date: _____
Intended Occupancy Date: _____
Project or Specified Area Shall Include: _____

SIGNATURE APPROVALS:

PROJECT ARCHITECT/ENGINEER AND DSA PROJECT INSPECTOR CERTIFICATIONS:

I have inspected the subject project and, to the best of my knowledge and ability, the Work is found to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the approved Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

NOTE: Commencement of applicable warranties by the approved Contract Documents begins at issuance of Notice of Completion NOT at Substantial Completion or Partial Substantial Completion.

A list of items to be completed or corrected is attached. Failure to include any items on such list does not relieve the responsibility of the Contractor to complete all Work in accordance with the approved Contract Documents.

Architect/Engineer of Record:

Name (Type or Print)	Authorized Representative (Signature)	Date

Chaffey College	**Certificate of Substantial Completion/Certificate of Partial Substantial Completion** **Construction Process**	**Bid No.** **2022PW01**

Project Name: Chino Instructional Building **Date:**

Architect/Engineer: **Contract No.**

Project Manager: **Contractor:**

Inspector of Record

Name (Type or Print)	Authorized Representative (Signature)	Date

Chaffey Community College - Owner

The Director of Operations and Maintenance concurs with Partial or Substantial Completion for the purpose of operations and maintenance of the completed Work.

Director - Facilities & Physical Plant:

Name (Type or Print)	Authorized Representative (Signature)	Date

Contractor Acceptance:

The Contractor will complete or correct the Work on the list of items attached hereto within _____ calendar days from the above date of Substantial Completion.

Name (Type or Print)	Authorized Representative (Signature)	Date

Project Manager:

Number of dates subject to Liquidated Damages:

Project Manager:

Name (Type or Print)	Authorized Representative (Signature)	Date

Chaffey Community College - Owner

Name (Type or Print)	Authorized Representative (Signature)	Date

Remarks:

Attached: Punch List Dated: _____

FORM "X"

Chaffey College

Chaffey Community College
5885 Haven Avenue
Rancho Cucamonga, CA 91737

CHANGE ORDER

Page __ of __

To Contractor:

_____
_____
_____
_____

Contract Number: _____
Change Order Date: _____
DSA Number: _____

CHANGE ORDER NUMBER: XXXX

Bid Number: _____
Engineer's Project Number: _____
Campus Project Number: _____
Contract Date: _____
Bid No. / Project Name: _____

The Contract is changed as follows.

No.		Days	Costs	Add or Deduct
1.	**CCD No. xxx / COR No. xxx**	**0 days**	**$0.00**	**(Add/Deduct)**
	Description:			
	Reason:			
	Requested By:			
2.	**CCD No. xxx / COR No. xxx**	**0 days**	**$0.00**	**(Add/Deduct)**
	Description:			
	Reason:			
	Requested By:			
	Total Days for Change Order No. XXXX:	**0 days**		
	Total Costs for Change Order No. XXXX:		**$ -**	**(Add/Deduct)**

CONTRACT SUM SUMMARY:

The original Contract Sum was:	$	-
The net change by previous authorized Change Orders:	$	-
The Contract Sum prior to this Change Order was:	$	-
The Contract Sum will be (increased) (decreased) (unchanged)	$	-
The new Contract Sum including this Change Order will be:	$	-

CONTRACT TIME SUMMARY:

The original Contract Completion Date:	
The net change by previously authorized Change Orders:	0 days
The previously authorized Completion Date:	
The Contract Time will be (increased) (decreased) (unchanged)	0 days
The new Contract Completion Date:	

CHANGE ORDER NUMBER: XXXX
Contract Number:
Change Order Date:
DSA Number:

By signing below, Architect certifies there are no structural changes contained in this Change Order, unless otherwise noted.

Architect:		**Date:**
	Representative:	
Contractor:		**Date:**
	Representative:	
Inspector of Record:		**Date:**
	Representative:	
Project Manager:		**Date:**
	Representative:	
Chaffey Community College District		**Date:**
	Representative:	
Division of State Architect		**Date:**
	Representative:	

FORM "P"

PLEASE SIGN & RETURN BY EMAIL/SCAN
ATTN: Myriam Arellano
Myriam.Arellano@Chaffey.edu

CONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT
California Civil Code Section 8132

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Identifying Information

District's Contract #: _____
Name of Claimant: _____
Name of Customer: Chaffey College
Project Name: _____
Job Location: 5885 Haven Ave, Rancho Cucamonga CA 91737
Owner: Chaffey College
Through Date: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: Chaffey College
Amount of Check: $_____
Check Payable to: _____

Exceptions

This document does not affect any of the following:

(1) Retentions.
(2) Extras for which the claimant has not received payment.
(3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:
Date(s) of waiver and release:_____
Amount(s) of unpaid progress payment(s): $_____
(4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Signature

Claimant's Signature: _____
Claimant's Title: _____
Date of Signature: _____

PLEASE SIGN & RETURN BY EMAIL/SCAN
ATTN: Myriam Arellano
Myriam.Arellano@Chaffey.edu

CONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT
California Civil Code Section 8136

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Identifying Information

District's Contract #: _____
Name of Claimant: _____
Name of Customer: Chaffey College
Project Name: _____
Job Location: 5885 Haven Ave, Rancho Cucamonga CA 91737
Owner: Chaffey College

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: Chaffey College
Amount of Check: $_____
Check Payable to: _____

Exceptions

This document does not affect any of the following:
Disputed claims for extras in the amount of: $_____

Signature

Claimant's Signature: _____
Claimant's Title: _____
Date of Signature: _____

Chaffey College	**Construction Change Directive (CCD)** **Construction Process**	**CCD #**

Project Name: **Agreement or Work:**

Design Consultant: **Contractor No.:** **Date:**

Project Manager: **CCD No.:** **Date:**

Contractor: **DSA No.** 04-

Contractor Address:

Situation Encountered:

Owner hereby directs Construction Contractor to proceed with the following changes to the work:

Adjustment to Contract Time:

- ☐ No Change
- ☐ Add/deduct _____ days
- ☐ To be negotiated
- ☐ Extended to _____

Adjustment to Contract Sum:

- ☐ No Change
- ☐ Time & Materials Not-To-Exceed _____
- ☐ Unit Price of _____ per _____
- ☐ To be negotiated

Exigency Authorization:

☐ When checked and approved, this CCD is a field directive required due to an emergency or unforeseen condition requiring immediate action. Contractor is directed to proceed with the Work described herein without further authorization. This directive does not constitute a waiver of or failure by Owner, Owner's Representative, to enforce any requirement in the Contract Documents. Any previous oral direction not incorporated into this document shall not be binding on Owner.

Authorized by:		**Date:**	

Signatures Approvals:

Contractor shall perform the work described herein as if included in the Work originally, per the terms and conditions of the Contract. This CCD becomes incorporated into the Contract upon execution by authorized persons listed below.

Chaffey Com. College District Measure P Bond Program Manager		Date:
Company Name		
A/E Firm Design Consultant:		Date:
Company Name	A/E's Name	
Chaffey Com. College District Executive Director, Business Services		Date:
Company Name		
Chaffey Com. College District VP, Administrative Services		Date:
Company Name		

Signature by Contractor acknowledges receipt of this Construction Change Directive and the documents referenced herein.

Contractor: Date:

Print Name:

CC: Chaffey College Purchasing Department / Project Inspector / Engineer

FORM "M"

Chaffey College	**Daily Job Report**	**Bid No.**
	Construction Process	

Project Name: **Date:**

Contractor: **Day of Week:**

Weather: **Temperature: High** **Low**

Contractor's Name	Classification	Man-power	Hrs. Worked	Work in Progress	Building

Notes/Deliveries:

Prepared by:

Title:

FORM "D"

Chaffey College	**Certificate of Final Inspection**	**Bid No.**

Project Name:	**Contract No.**	**Date:**
Project Manager:		
Architect/Engineer:	**Contractor:**	
Company:	**Company:**	
Address:	**Address:**	

Project Architect/Engineer Certification:

As Project (☐ Architect ☐ Engineer), I have inspected this project and, in my professional opinion, it is complete and in accordance with the approved Contract Documents.

Name (Type of Print)	Authorized Representative (Signature)	Date

Project Manager

As Project Manager, I have carefully reviewed the closeout requirements specified in the Contract Documents and certify that the Contractor has fulfilled all of their requirements.

Name (Type of Print)	Authorized Representative (Signature)	Date

Facility Information:

1. Type of Project: ☐ Addition ☐ Remodeling ☐ Renovation ☐ New ☐ Repairs ☐ Other
2. Source of Funds: ☐ Bond ☐ State ☐ Other _____
3. Adjusted Final Contract Amount: $_____
4. Project Gross Square Foot: _____ sq. ft.
5. Cost Per Gross Square Foot: $_____
6. Project Substantial Completion Date: $_____
7. Project Final Completion Date: _____
8. Date of occupancy (if applicable): _____
9. Additional Information:

FORM "Y"

Chaffey College	**Request For Information (RFI)** **Construction Process**	**Bid No.**

Project Name: **RFI No.:**

Contractor: **Date:**

Architect: **Reference CPR, CCD #:**

SUBJECT:

SUBCONTRACTOR: **ACTIVITY ID #:**

DRAWING No.: **SPEC. SECTION:**

INFORMATION REQUESTED:

SUGGESTED COURSE OF ACTION:

Submitted by **Date Response Required**

Representative of firm

Schedule Impact: ❑ **Yes** ❑ **No** **Cost Impact:** ❑ **Yes** ❑ **No**

Date Submitted:

RESPONSE:

Response by **Date**

Representative of firm (Engineer)

FORM "J"

Chaffey College	**Request For Proposal (RFP)** **Construction Process**	**RFP #**

Project Name:	**Agreement or Work:**	
Design Consultant:	**Contractor No.:**	**Date:**
Project Manager:	**RFP No.:**	**Date:**
Contractor:	**DSA No.**	
Contractor Address:		

Please submit an itemized quotation for adjustments, if any, in the Contract Amount, Milestones, and/or Contract Time reflecting the proposed Work described herein within ten (10) days from date of issue. The itemized quotation must be submitted within the time frames as specified by the Construction Manager after receipt of this Request For Proposal (RFP). This is not an authorization to proceed with the work described herein unless and until approved by the Owner. On approval, this change will be included in a Change Order, which will provide the formal Contract change.

THIS IN NOT A CHANGE ORDER OR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED HEREIN.

Description of Work:

Attachments:

Issued by:

Engineer Signature	Name (Printed)	Date

Change Order Proposal is due from the Contractor by: _____
Date

Measure P Bond Program Manager	Name (Printed)	Date
Chaffey Community College District Recommended by Executive Director, Business Services	Name (Printed)	Date
Chaffey Community College District Accepted by VP, Administrative Services	Name (Printed)	Date

Chaffey College	**Submittal Routing Form (SRF)** **Construction Process**	**Bid No.**

Project Name: **Bid Division:**

Engineer's Project No.: **Submittal No.:**

Contractor's Project No.: **Date Submitted:**

To: Bernards **From:**

Specification Number/Section:

Description:

_____ Initial Submittal _____ Submittal was a previously approved substitution.

_____ Resubmittal No. _____ Approved Substitution Request Form is attached.

Scheduled Date of Submittal: ____/____/____ Number of: ___ Copies: ___ Samples: ___

[Per approved Submittal Schedule]

Contractor Certification: [Contractor shall check either A or B and sign the following:]

The contractor certifies that this submittal or shop drawing has been reviewed, approved and coordinated in accordance with the requirements of Specification Section 01340.

A. _____ The material and/or equipment included in this submittal meet all the requirements specified or shown in the Contract Documents.

B. _____ The material and/or equipment included in this submittal meets all the requirements specified or shown in the Contract Documents except for the deviations listed on the attached sheet and/or indicated on the submittal or shop drawings.

By: Date ____/____/____

[Architect's use only below this line.]

Number of copies received: _____ **Date received:** ____/____/____

Action: ____No exception taken. _____Make corrections noted.
____Revise and Resubmit _____Rejected.

Comments: [Attach additional sheet(s) as needed.]

Final Distribution: [Indicate number of copies sent.] **Date sent:** _____ / _____ / _____

CM: Engineer Contractor: Other:

FORM "H"

Chaffey College	**Substitution Request (SR)**	**SR #**
	Construction Process	

Project Name:	**Agreement or Work:**	
Design Consultant:	**Contractor No.:**	**Date:**
Project Manager:	**Substitution No.:**	**Date:**
Contractor:	**DSA No.** 04-	
Contractor Address:		

Contractor submits the proposed "or equal" to such items as specified in accordance with General Conditions and Section 01340 of the Contract Specifications. If the ENGINEER, with the concurrence of the OWNER, shall find any such item so described, equal to the respective item specified, the CONSTRUCTION MANAGER/OWNER will process the substitution request in writing before the CONTRACTOR may furnish such item, together with all necessary labor, materials, equipment, and incidentals required to perform complete the work.

Specified Item:
Specification Section/Drawing No./Detail No.:
Proposed "or Equal":
Reason for Substitution:
Cost Impact to OWNER:
Schedule Impact:
Supporting Cut Sheets, details and Required DSA Approvals Attached:

CERTIFICATION

Under penalty of perjury under the Laws of California, I certify that the proposed substitution will be readily available, perform adequately the functions and achieve the results called for by the design concept, be similar in substance to specified, and be suited to the same use as that specified.

Contractor:		Date:
Company Name	Project Manager's Name	

CC: Chaffey College Purchasing Department
Project Inspector
Engineer

FORM "I"

Chaffey College	**Letter of Transmittal** **Construction Process**	**Bid No.**

DATE: _____

TO: _____

_____

_____

_____

PROJECT: _____

_____

WE ARE SENDING YOU:

☐ Copy of Letter ☐ Plans ☐ Shop Drawings ☐ Contract/PO ☐ Sketch
☐ Report ☐ Specifications ☐ Samples ☐ Change Order ☐ _____

VIA: ☐ US Mail ☐ Next Day Delivery ☐ 2nd Day Delivery ☐ Hand Delivered ☐ Fax _____

ITEM	DATE	NO.	DESCRIPTION

THESE ARE TRANSMITTED AS INDICATED BELOW:

☐ For Your Use ☐ Approved ☐ For Approval
☐ For Review & Comment ☐ Approved as noted ☐ _____
☐ As Requested ☐ Returned for corrections ☐ _____

COMMENTS:

cc: _____ **SIGNED:** _____

FORM "G"

Chaffey College	**System Interruption/ Utility Outage Notification** **Construction Process**	**Bid No.**

Minimum 72 Hour Notice Required

This form is valid up to a maximum of a 30 day duration - if duration exceeds 30 days, a second form is to be processed.

Project Name: **Request No.:**

Contractor: **Date:**

Type (electrical, gas, data, water, sewer, etc.):
System(s) Affected:
Date(s), Time(s) and Duration of Interruption/Outage:
Area(s) and Buildings Affected:
Reasons for Interruption/Outage:

ACKNOWLEDGEMENT

Contractor	**Bond Team Project Manager**	**Chaffey College Public Safety**	**Chaffey College M & O Department**	**Chaffey College IT Deparment**
Signature	Signature	Signature	Signature	Signature
Date	Date	Date	Date	Date

Chaffey College Purchasing Services	**Project Inspector**
Signature	Signature
Date	Date

Bond Team's Project Manager is responsible for distribution to the following parties: Maintenance, Fire Department, Campus Security, and Campus Cabinet (President, Vice Presidents, and Deans).

Distributed by: Date: Time:

FORM "C"

PLEASE SIGN & RETURN BY EMAIL/SCAN
ATTN: Myriam Arellano
Myriam.Arellano@Chaffey.edu

UNCONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT
California Civil Code Section 8134

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

District's Contract #: _____
Name of Claimant: _____
Name of Customer: Chaffey College
Project Name: _____
Job Location: 5885 Haven Ave, Rancho Cucamonga, CA 91737
Owner: Chaffey College
Through Date: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment: $_____

Exceptions

This document does not affect any of the following:
(1) Retentions.
(2) Extras for which the claimant has not received payment.
(3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Signature

Claimant's Signature: _____
Claimant's Title: _____
Date of Signature: _____

PLEASE SIGN & RETURN BY EMAIL/SCAN
ATTN: Myriam Arellano
Myriam.Arellano@Chaffey.edu

UNCONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT
California Civil Code Section 8138

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

District's Contract #: _____
Name of Claimant: _____
Name of Customer: Chaffey College
Project Name: _____
Job Location: 5885 Haven Ave, Rancho Cucamonga, CA 91737
Owner: Chaffey College

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or materials delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect the following:
Disputed claims for extras in the amount of: $_____

Signature

Claimant's Signature: _____
Claimant's Title: _____
Date of Signature: _____

Chaffey College

MANDATORY
PRE-BID MEETING & JOB WALK AGENDA

BID No. xxxxxx

Insert Project Name

Location: Insert Address/Campus
Date:

I. INTRODUCTIONS

A. Please Sign Attendance Sheet

B. Please silence your mobile/electronic devices

C. Welcome and Introductions

II. GENERAL INFORMATION

A. Notice for Informal Invitation to Bid as posted on PlanetBids on (Insert Date)

III. PROJECT DESCRIPTION

A. General Description of Project:
   1.

B. Agencies Having Jurisdiction

   1. Chaffey Community College District Governing Board
   2. City of xxxx

C. Architects
   1. Not applicable

D. Management Process

   1. Insert Project Manager and Consultant for monitoring.

Chaffey College

IV. PROJECT OVERVIEW

A. Here are the key notes of the project overview:

i. The Contractor will perform (insert List overview of scope).

V. PUBLIC BID PROCESS

A. Notice of Invitation is for Bid # xxxx is through PlanetBids

B. Bid Submission – will be on (Insert Date) is through PlanetBids.

C. Bid submission instructions – read and follow them carefully

D. Bidding documents required

1. Bid form – note the allowance in the bidding documents
2. Designated Subcontractors listing, if applicable
3. Non-collusion declaration
4. Bid bond

VI. BID AND CONTRACT REQUIREMENTS

A. Schedule

1. Communications

   a. Pre-Award: Contractor to (Insert PM)

   b. Post Award: Contractor to (Insert PM)

2. Timeline
   a. Any Request for Clarifications are due (Insert Date) submitted through PlanetBids.
   b. Any Addendum to be issued will be by (Insert Date)
   c. Bids due by (Insert Date) submitted through PlanetBids.
   d. Start of Construction – anticipated start date of (Insert Date)

B. Bidder Qualifications and Bid Form

1. License and Project Experience: Class XX

Chaffey College

a. School experience – need 5 projects listed – (Insert Type) experience - carefully read and complete the "Completed Projects" form to detail your experience and technical expertise.
b. Expanded List of Subcontractors- due within 24 hours of the bid submission, if applicable.

C. Contract Terms and Conditions

1. Public Works Project is requiring Director of Industrial Relations Registration (DIR) for all trades and Prevailing Wage requirements.

2. Bonds
   a. Bid bond
   b. 100% performance and payment bond(s) will be required in the contract.

3. Completion Time: XX calendar days with a potential start date of (Insert Date)

4. Liquidated Damages: **$XXXX** per calendar day

VII. JOB WALK

A. Site visit immediately following pre-bid meeting.
B. Site visits requested after the job walk require 48-hour notice

1. Contact (Insert Name) at (xxx) xxx-xxxx to schedule any site visits after the job walk, if necessary.

Pre Bid Check List

CHECK LIST	Dates	Excellent	Average	Poor	Comments / Goals
1. Planning					
· Project Descriptions					
· Clients Goals, Needs & Wants Obtained					
· Internal Responsibility Chart Established					
· Quality Management Plan Established					
· Design Contract(s)					
· All deliverables in Schedule (CD, DD & WD)					
· Architect Meeting Obligations					
2. Funding					
· Funding Sources Identified					
· Funding Values Obtained from Client					
· Agency Approval(s)					
3. Design Committee					
· Design Committee Developed					
· Meetings Times Established					
· Meeting Minutes Taken & Distr.					
4. CM Plan					
· Sections Outlined					
· Reviewed with Client & Architect					
· Issued to Client & Architect					
· Update Procedure & Methods					
5. Constructability Review					
· 50% Drawing Review Completed					
· 90% Drawing Review Completed					
· 90% Drawing Back-check Completed					
6. Estimate					
· Conceptual Estimate					
· Definitive Estimate					
· Escalation Allowances					
· Estimate vs. Bid Amounts					
7. Cost Control					
· Line Item Budget Prepared					
· Funds vs. Budget Reconciliation					
· Contingency Allowances					

CHECK LIST	Dates	Excellent	Average	Poor	Comments / Goals
· Cost Reporting					
8. Work Scopes					
· Bid Package Identification					
· Bid Package Work Scopes					
9. Condition of the Contract					
· Delivery Method					
· General Conditions					
· General Requirements – Division 1					
10. Filing Systems					
· Project Set-up					
· Electronic Files					
11. DSA Plan Check					
· Drawings Ready					
· Cost Amount ID & Check from Client					
· Constructability Comment Incorporated					
· ADA Plan Check Complete					
· Structural Plan Check Complete					
· Fire Life Safety Plan Check Complete					
· Drawings Stamped Out					
12. Bid Schedule					
· Schedule for Bid					
· DVBE Requirements					
· Board Approvals					

Check Performed By: _____ _____ Date: _____

BID/AWARD SCHEDULE:	**Bid. No.**
Project Name:	
Target Board Meeting Date	
Due Date for Project Manager to submit Completed Public Works Documents to Purchasing Services	
Submit Advertisement - Notice Inviting Bids (NIB) to Inland Valley Daily Bulletin	
Bid Package to ARC Reprographics for printing only	
Newspaper (IVDB) Advertisement, Week 1 **Post Bid Solicitation - Notice Inviting Bids (NIB), to Purchasing's Website AND Send Email Broadcast using PlanetBids**	
Release bid on PlanetBids	
Newspaper (IVDB) Advertisement, Week 2	
Mandatory Pre-Bid Conference Meeting and Job-walk at Shade Structure Adjacent to MACC Bldg.	
Post Pre-Bid Meeting and Job-walk Sign-In Sheet to Purchasing's Website AND PlanetBids Site	
Final Date for Pre-Bid RFI/RFC BY 12:00 P.M. to be submitted on PlanetBids site	
IF NEEDED, Issue/Post, Addendum, to Purchasing's Website, ,PlanetBids AND Send Email Broadcast using PlanetBids	
Bids Due in electronic format only - submitted through PlanetBids	
Post Bid Opening Results to Purchasing's Website AND PlanetBids site	
Expanded List of Subcontractors Due (24 hours after Bid Opening)	
Post Expanded List of Subcontractors to Purchasing's Website AND PlanetBids Site	
Bids Evaluated for Responsiveness and Responsibility	
Bid Protest Period Expires (5 days)	
Board Agenda Item Submitted to Business Services	
Board Meeting - Approval to Award Contract	
Notice of Award Issued Contract mailed	
Start of Construction – assume 92 day period	
Completion	

Chaffey College

MANDATORY
PRE-BID MEETING & JOB WALK AGENDA

BID No. xxxxxx

Insert Project Name

Location: Insert Address/Campus
Date:

I. INTRODUCTIONS

A. Please Sign Attendance Sheet

B. Please silence your mobile/electronic devices

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A. General Description of Project:
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   1. Chaffey Community College District Governing Board
   2. City of xxxx

C. Architects
   1. Not applicable

D. Management Process

   1. Insert Project Manager and Consultant for monitoring.

Chaffey College

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2. Designated Subcontractors listing, if applicable
3. Non-collusion declaration
4. Bid bond

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   a. Pre-Award: Contractor to (Insert PM)

   b. Post Award: Contractor to (Insert PM)

2. Timeline
   a. Any Request for Clarifications are due (Insert Date) submitted through PlanetBids.
   b. Any Addendum to be issued will be by (Insert Date)
   c. Bids due by (Insert Date) submitted through PlanetBids.
   d. Start of Construction – anticipated start date of (Insert Date)

B. Bidder Qualifications and Bid Form

1. License and Project Experience: Class XX

Chaffey College

a. School experience – need 5 projects listed – (Insert Type) experience - carefully read and complete the "Completed Projects" form to detail your experience and technical expertise.
b. Expanded List of Subcontractors- due within 24 hours of the bid submission, if applicable.

C. Contract Terms and Conditions

1. Public Works Project is requiring Director of Industrial Relations Registration (DIR) for all trades and Prevailing Wage requirements.

2. Bonds
   a. Bid bond
   b. 100% performance and payment bond(s) will be required in the contract.

3. Completion Time: XX calendar days with a potential start date of (Insert Date)

4. Liquidated Damages: **$XXXX** per calendar day

VII. JOB WALK

A. Site visit immediately following pre-bid meeting.
B. Site visits requested after the job walk require 48-hour notice

1. Contact (Insert Name) at (xxx) xxx-xxxx to schedule any site visits after the job walk, if necessary.

Chaffey College

PRE-BID MEETING & JOB WALK
Name of Project
Date
Chaffey College - List location/address

Contact Name	Company Name	Prime/Sub	Address	Phone Number/ Fax Number	E-Mail Address
		☐Prime ☐Sub ☐Supplier			
		☐Prime ☐Sub ☐Supplier			
		☐Prime ☐Sub ☐Supplier			
		☐Prime ☐Sub ☐Supplier			
		☐Prime ☐Sub ☐Supplier			
		☐Prime ☐Sub ☐Supplier			
		☐Prime ☐Sub ☐Supplier			
		☐Prime ☐Sub ☐Supplier			
		☐Prime ☐Sub ☐Supplier			

BID NAME:
Bid No:
Bid Opening Location:
Bid Due Date / Time:

Prime Contractor	Bid Form	Contractors License #	Subcontractor Listing Form	Bid Bond	Non-Collusion Affidavit	Bidder Info form complete	School Project Experience	Pre-Bid Meeting & Job Walk	DVBE form	Public Works Regist. Cert.	Addendum # 1	TOTAL BASE BID PRICE

Chaffey College

EVALUATION FORM FOR RFQ xxxx

Name of RFQ

Date

Name of RFQ

Company	Evaluator 1	Evaluator 2	Evaluator 3	Evaluator 4	Evaluator 5	Evaluator 6	Evaluator 7	TOTAL SCORE

*Committee recommends selecting the top 8 firms for (Insert Name of RFQ/P) RFQ xxxx

Chaffey College

INTERVIEW EVALUATION FORM FOR RFQ xxxx

(Insert Name of RFQ)

Name of RFQ

Contact Name	Company	Ranking
		1
		2
		3
		4
		5

*Panel recommends selecting (Insert Name) for (Type of Services for RFQ) Services RFQ xxxx

Bid Evaluation Form For:
Bid No.
Bid Due:
Verified as of

Code Name	A	B	C
Evaluation Criteria			
License			
Responsive (Yes/No)			
Responsible (Yes/No)			
License Number			
Current and Active (Yes/No)			
License Expiration Date			
Surety			
Surety Company			
Bonding Number			
CA admitted surety (Yes/No)			
Status - Unlimited-Normal (Yes/No)			
Section 1 - Bid Form			
Responsive (Yes/No)			
Responsible (Yes/No)			
Section 2 - Bid Data Forms			
Responsive (Yes/No)			
Responsible (Yes/No)			
Section 2.A - List of Proposed Subcontractors			
Trade			
Subcontractor			
Trade			
Section 2.B - Bid Bond			
Bid bond, cashier's check, or certified check for 10% of Total Bid Price (Y/N)			
Dollar Amount (if cashier's or certified check)			
Section 3 - Non-Collusion Affidavit			
Responsive (Yes/No)			
Responsible (Yes/No)			
Section 4 - Bidder Information Forms			
Responsive (Yes/No)			
Responsible (Yes/No)			
Section 4.A - Information About Bidder			
Sufficient experience to complete project (Yes/No) 3 Years Experience			
Section 4.B - List of Current Projects (Backlog)			
Sufficient resources to complete project (Yes/No)			
Section 4.C - List of Completed Projects			
Confirmation of positive references (Yes/No)			
Contractor has successfully completed projects as required in Supplementary General Conditions, Item M (Yes/No)			
Section 4.D - Experience and Technical Qualifications Questionnaire			
Sufficient expertise to complete project (Yes/No)			
Section 4.E - Verification and Execution			
Signed by a duly authorized representative (Yes/No)			
Section 5 - Notice Of Pre-Bid Conference and Job Walk			
Responsive (Yes/No)			
Responsible (Yes/No)			
Section 6 - DVBE Forms			
Responsive / Responsible (Yes/No)			
Section 7 - Public Works - DIR Cert Forms			
Responsive / Responsible (Yes/No)			
Expanded List of Subcontractors			
Submitted within 24 hours (Yes/No)			
Addendum # 1 & # 2 acknowledged			
on the Bid Form			

BID EVALUATION FORM

RFP/SOQ:

	Firm Name:				
	Firm Location:				
	Fixed Fee:				
Section Title	Max. Points:	Firms Points	Firms Points	Firms Points	Firms Points
Section 1: Firms Data					
A. Location					
Within the District boundary (7 pts)					
15 miles within District boundary (4 pts)					
More than 15 miles from District boundary (0 pts)					
B. Firms Personnel Staffing					
C. Capacity & Methodology					
D. Experience & References					
E. Customer Service					
F. Local Business Outreach					
G. Litigation					
Section 2: Fee Schedule					
10% (21-25 pts)					
15% (16-20 pts)					
20% (11-15 pts)					
30% (1-10)					
Section 3: Overall Quality					
Total Points		0	0	0	0

Chaffey College

Chaffey Community College District
Purchasing Services

NOTICE OF AWARD

September 22, 2017

Robert Clapper Construction Services, Inc.
Attention: Robert Clapper, President
2223 N. Locust Avenue
Rialto, CA 92377

RE: BID NO. 2018PW40, Measure L Build Out Projects

Sample

Congratulations! On September 21, 2017, the Governing Board of Chaffey Community College District of San Bernardino County, California (the Owner) authorized the award of the Contract to Robert Clapper Construction Services, Inc., in the amount of **NINE MILLION EIGHT HUNDRED NINE THOUSAND AND 00/100 DOLLARS ($9,809,000.00)**, as the lowest responsive and responsible bidder for construction of the Measure L Buildout Projects, per the Bid and Contract Documents of Owner's Bid Number 2018PW40.

As the successful bidder, you must complete and return the following documents to my attention at the address at the bottom of this Notice:

(1) four executed originals of the enclosed Contract;
(2) four executed originals of the enclosed Performance Bond;
(3) four executed originals of the enclosed Payment Bond;
(4) certification from the County Clerk verifying, Pursuant to Code of Civil Procedure Section 995.660, that the Payment Bond surety's certificate of authority has not been surrendered, revoked, canceled, annulled or suspended or, in the event that it has been suspended, that it has been renewed;
(5) required insurance documents/certificates;
(6) Drug-Free Workplace Certification;
(7) Recycled Content Certification;
(8) Asbestos-Free Materials Certification;
(9) Iran Contracting Act Certification;
(10) Cost Breakdown of the Base Bid Price with all alternates providing the information required per Article 9 of the General Conditions; and
(11) Preliminary Construction Schedule in accordance with Division 1 of the Specifications.

You have the option to enter the enclosed Escrow Agreement for Security Deposits in lieu of Retention. To elect this option, please return four (4) executed copies. Otherwise, the Owner will hold retention.

You have **ten (10)** Calendar Days from the date of receipt of this Notice to return all of the required documents and certifications. If you fail to sign and return all of the above items as required, your bid may be rejected. After you duly submit all of the required documents and certifications, we will issue a Notice to Proceed with the commencement date.

Again, congratulations! We look forward to working with you.

Sincerely,

Kim Erickson
Executive Director, Business Services

Enclosures

Chaffey College

Chaffey Community College District
Purchasing Services

NOTICE TO PROCEED

BID No. 2018PW40
Measure L Build Out Projects
October 11, 2017

Robert Clapper Construction Services, Inc.
Attn: Robert W. Clapper, President
2223 North Locust Avenue
Rialto, CA 92377

RE: Contract No. 2018PW40, Contract Amount $9,809,000.00

Dear Mr. Clapper:

In accordance with your Contract, you are hereby notified to commence work on the Project on or before **October 11, 2017**, and to complete the Work within **430** consecutive calendar days, which is no later than **December 14, 2018**, the Date of Substantial Completion.

The Contract provides for assessment of liquidated damages of **$2,000.00 per day** for each consecutive calendar day that the Work remains incomplete after the Substantial Completion Date specified above.

Sample

Please coordinate mobilization and direct any coordination questions regarding this Notice to the Project Manager, **William Winslow, Program Manager, Bernards**, at any of the following numbers: (909) 652-6163 – Direct Line, (909) 841-8579 – Cellular Phone, or (909) 652-6175 – Fax.

Enclosed with this Notice are your fully executed originals of the following documents: Contract, Performance Bond, and Payment Bond.

Congratulations on your award of this Contract. We look forward to working with you.

Sincerely,

Kim Erickson
Executive Director, Business Services

cc: Lisa Bailey, Chaffey College, Associate Superintendent, Business Services and Economic Development
Melanie Siddiqi, Chaffey College, Vice President, Administrative Affairs
Troy Ament, Chaffey College, Director, Facilities/Physical Plant
Stephen Lux, Chaffey College, Administrator, Campus Police
Eva Ramirez, Interim Director, Purchasing Services
Myriam Arellano, Chaffey College, Accounting Manager
William Winslow, Program Manager, Bernards
DLR Group
Arch Insurance Company

Chaffey College

Chaffey Measure P Bond Program
MEETING MINUTES

Project: Author:

Meeting Number: Date:
Meeting Time:

1. **Introduction / Greetings**

2. **Previous Meeting Minutes #xx**
   2.1. Approval of xxxx project meeting minutes.

3. **Safety**
   3.1. Noise and interruption of classes –
   3.2. Tree protection 01520 specifications –
   3.3. Trade and consultant parking-
   3.4. Site Fencing –
   3.5. Site Clean Up-
   3.6. Safety on Site –

4. **Testing & Inspections**
   4.1.

5. **SWPPs & BMPs**
   5.1.

6. **Schedule and Status**
   6.1. Master schedule update

   6.2. Three (3) Week Look-ahead Schedule of Activities,

7. **Submittals and RFI's**
   7.1. Submittals logs and updates –

   7.2. RFI logs and updates –

   7.3. CCDs Status-

   7.4. Deviation Notices -

8. **New Business / General Information**

   8.1. Testing and Inspections

   8.2. CORs in process:

   8.3. Site walks @

   8.4. Closeouts-

   8.5. Discussion Items from the previous meeting:

Chaffey College

Chaffey Measure P Bond Program
MEETING MINUTES

8.6. New Open Discussion Items

9. Other

9.1. Next Formal Project Meeting:
9.2. Next Informal Site meeting: TBD
9.3. Next School Holidays-
9.4. Questions:

Chaffey College	**Inspection Request (IR)** **Construction Process**	**Bid No.**

Project Name: **IR No.:**

Contractor: **Requested by:** **Date:**

Subcontractor: **Requested by:**

Date Inspection Required: **Time Required:**

Re-inspection: Yes ❑ **No** ❑ **If yes, reference previous IR No.:**

INSPECTION AREA:

Area:	Related Schedule Activity Number and Description:
	Detailed Description:

TYPE OF INSPECTION (List Specification Section):

02 Demolition	06 Woods/Plastics	11 Equipment
02 Sitework	06 Casework	14 Elevators
02 Soils Inspection	07 Thermal/Moisture Protection	15 Mechanical
03 Rebar	07 Waterproofing	15 Plumbing
03 Concrete	07 Roofing	15 Fire Sprinklers
03 Shotcrete	07 Finishes	16 Electrical
04 Masonry	08 Doors/Windows	Other
05 Structural Steel	09 Framing/Gyp Board	Other
05 Miscellaneous Steel	10 Specialties	NNC#

INSPECTION RESULTS:

☐ ***ACCEPTED*** ☐ ***MAKE CORRECTIONS NOTED / PROCEED WITH WORK*** ☐ ***REJECTED***

REASON FOR REJECTION:

Code Section: Specification Section:

Inspector's Comments:

Inspected by: **Date:**

FORM "F"

Chaffey College	**Notice of Non-Compliance (NNC)** **Construction Process**	**Bid No.**

Project Name: **NNC No.:**

Contractor: **Date:**

Location of Non-Compliance:

NON-COMPLIANCE

_____Clean-up Debris _____Faulty Workmanship

_____Exceeds Material _____Safety Orders

_____Excess Equipment ____Other: _____

Description:

To be completed by: **Time:**

Failure to comply with the above directive in the time specified automatically authorizes Chaffey College to either perform or request the services of an alternate contractor to perform the subject work and advance on behalf of the Contractor listed above.

ACKNOWLEDGEMENT			WORK CORRECTED
Bond Team Project Manager	**Contractor**	**Project Inspector**	**Project Inspector**
Signature	Signature	Signature	Signature
Date	Date	Date	Date Reinspected

FORM "E"

Chaffey College	**Off-Hours Request (OHR)** **Construction Process**	**Bid No.**

Project Name: **Request No.:**

Contractor: **Date:**

Area(s) Affected:

Date work is to be performed:

Description of work to be performed:

ACKNOWLEDGEMENT

Contractor	**Construction Manager**	**Chaffey College Public Safety**	**Chaffey College Purchasing Services**	**Project Inspector**
Signature	Signature	Signature	Signature	Signature
Date	Date	Date	Date	Date

FORM "B"

Chaffey College	**Contractor Information** **Construction Process**	**Bid No.**

Project Name: **Date**:

Address:

Mailing Address:

COMPANY CONTACTS

General Correspondence:			PHONE	
			FAX	
	Name	Title	CELL	
			E-MAIL	
Billing and Pay Request:			PHONE	
			FAX	
	Name	Title	CELL	
			E-MAIL	
Field Issues/Coordination:			PHONE	
			FAX	
	Name	Title	CELL	
			E-MAIL	
Proposal Request & Change Order Pricing:			PHONE	
			FAX	
	Name	Title	CELL	
			E-MAIL	
Submittals:			PHONE	
			FAX	
	Name	Title	CELL	
			E-MAIL	
RFIs:			PHONE	
			FAX	
	Name	Title	CELL	
			E-MAIL	
On Site Contact:			PHONE	
			CELL	
	Name	Title	NEXTEL	
			E-MAIL	
On Site Contact:			PHONE	
			CELL	
	Name	Title	NEXTEL	
			E-MAIL	

24-HOUR EMERGENCY CONTACT

Name:	**Phone No.:**
Title:	**Cellphone No.:**
Name:	**Phone No.:**
Title:	**Cellphone No.:**

Chaffey College

Chaffey Community College District
Measure P Bond Project #
Name of Project:
(Insert Name of) Campus

Agenda

Kick Off Construction Meeting
Bond Trailer/Conference Room
(Insert Date & Time)

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1. **Overview**
   - 1.1. Introduction
   - 1.2. Self-Introductions/Sign-in Sheet

2. **Contract**
   - 2.1. Update – fully executed
   - 2.2. Notice To Proceed Date –

3. **Project Schedule**
   - 3.1. Update
   - 3.2. Key milestones

4. **Project Submittals**
   - 4.1. Deferred submittals - none
   - 4.2. Balance of submittals

5. **Project Procedures Manual**
   - 5.1. Project Team
     - 5.1.1. Point of Contacts
   - 5.2. Project Site Information
     - 5.2.1. Required Contractor Information
     - 5.2.2. Identification of Workers
     - 5.2.3. Local Business Enterprises Policy
     - 5.2.4. Hours of Work
     - 5.2.5. Off-Hours Request
     - 5.2.6. Utility Shutdowns / System Interruptions
     - 5.2.7. Building Keys
     - 5.2.8. Parking
     - 5.2.9. Deliveries
     - 5.2.10. Visitors
     - 5.2.11. Field Office and Material Storage/MSDS
     - 5.2.12. Safety
       - 5.2.12.1. Excavation and Foundation Work
       - 5.2.12.2. Crane Lift Operations & Pre-Inspections
       - 5.2.12.3. Heat Illness Prevention
     - 5.2.13. Supervision
     - 5.2.14. Daily Reports
     - 5.2.15. Workers and Workmanship
     - 5.2.16. Quality Control
     - 5.2.17. Housekeeping
     - 5.2.18. Construction Progress Meetings
     - 5.2.19. Inspections
     - 5.2.20. Separate Contractors

6. **Project Kick-Off**
   - 6.1. Dual Gate System
   - 6.2. Storm Water Pollution Prevention Plan (SWPPP and BMPs)
   - 6.3. Labor Compliance Program
   - 6.4. Director of Industrial Relations Registration

Chaffey College

Chaffey Community College District
Measure P Bond Project #
Name of Project:
(Insert Name of) Campus

Agenda

Kick Off Construction Meeting
Bond Trailer/Conference Room
(Insert Date & Time)

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7. Hazardous Abatement Pre-Con – B2 Environmental
- 7.1. AQMD 10 day Notification
- 7.2. Submittals

8. Project Administration
- 8.1. Correspondence
- 8.2. Schedule Requirements
- 8.3. Submittals Requirements
- 8.4. DSA
  - 8.4.1. DSA 102 – set up of The Box
  - 8.4.2. DSA Kick Off Meeting with DSA Field Engineer – Jack Cohen
- 8.5. Substitutions
- 8.6. Record Drawings/As-Builts
- 8.7. Request For Information (RFI)
- 8.8. Supplementary Instructions (SI)
- 8.9. Request for Proposal (RFP)
- 8.10. Construction Change Directive (CCD)
- 8.11. Change Order Request (COR)
- 8.12. Change Orders (CO)
- 8.13. Field Change Documents (FCD)

9. Payment Procedures
- 9.1. Schedule of Values
- 9.2. Monthly Payment Requests
- 9.3. Escrow Accounts – YES
- 9.4. Allowances
- 9.5. Certified Payroll Records and DIR

10. Project Close Out
- 10.1. Maintenance, Warranty, Operations Manual
- 10.2. Substantial Completion
- 10.3. Notice of Completion
- 10.4. Retention Billing
- 10.5. Notice of Warranty Work

11. Other
- 11.1. Next Project Meeting: Questions:

DSA Closeout Checklist

Project Name:	
DSA A#:	DSA File #:
CM:	IOR:

See DSA PR13-01 For More information

DSA Approved Drawings, Specs, and DSA 103	☐
Addenda (DSA 140) approved by DSA	☐
To Start DSA Box	
DSA 5-PI (Project Inspector) approved by DSA	☐
DSA 5-AI (Assistant Inspector) approved by DSA	☐
DSA 5-SI (Special Inspector) approved by DSA	☐
DSA 5-IPI (In-Plant Project Inspector) approved by DSA	☐
DSA 102-IC	☐
During Construction	
IOR Issuing DSA 151 Notifications	☐
IOR Issuing DSA 155 Semi-Monthly Reports	☐
IOR Filling Out DSA 152 Inspection Cards	☐
In-Plant Inspector Filling Out DSA 152-IPI	☐
DSA 156 Commencement/Completion of Work Notification (By Contractor)	☐
DSA 108 Change in Delegation of Responsibility	☐
DSA 109 Transfer of Responsibility: Geotechnical Engineer	☐
DSA 119 Project Inspector Performance Review (By DSA)	☐
DSA 130 Certificate of Compliance (For Folding and Telescoping Seating Fabricator)	☐
DSA 6AE Interim Verified Reports	☐
DSA 291 Lab of Record Interim Verified Reports	☐
DSA 292 Special inspection Interim Verified Reports	☐
DSA 293 Geotechnical Interim Verified Reports	☐
Respond to DSA 135 Field Trip Notes as Required	☐
Resolve any DSA 154 Notice of Deviations	☐

Construction Change Documents and Revisions approved by DSA (DSA 140)	☐
Testing and Special Inspection Verified Reports	☐
DSA 211 Attachment of Additional Comments/Information (If Required)	☐
DSA Closeout	
DSA 301-N Notification of Requirement for Certification	☐
DSA 180 Project Inspector Performance Record (By DSA)	☐
DSA 6-AE Final Verified Report	☐
DSA 6-C Final Verified Report	☐
DSA 6-PI Final Verified Report	☐
DSA 291 Lab of Record Final Verified Report	☐
DSA 292 Special Inspection Final Verified Report	☐
DSA 293 Geotechnical Final Verified Report	☐
DSA 168 Statement of Final Actual Cost	☐
DSA Reconciliation Fee	☐
Receipt of Final DSA Certification	☐

Chaffey College	**Notice of Warranty Work (NWW)** **Construction Process**	**Bid No.**

SECTION 1: "IDENTIFY" PROBLEM [Department to complete]

Project Name:

Reported By: _____ **Date:** _____ **Time:** _____
Print Name

☐ **URGENT** *(only check here if Life-Safety issue)*

Description of Problem *(one type of issue per form-e.g. plumbing, electrical, air conditioning, etc)* **:**

Bldg / Rm #:

SECTION 2: "DIRECT" CONTRACTOR [Bernards to complete]

Issued By: _____ **Date:** _____ **NWW No.**
Projet Manager (name of individual)

Fax To: _____ **Contact:** _____ **Fax No.:** _____
(name of contractor / bid package) **(name of contact)** **(contractor fax)**

Warranty Expiration Date: _____

Days Allowed for Completion: _____

Additional Comments: ☑ If determined to be maintenance issue, Project Manager toadvise originator

Contractor to confirm work done, to Project Manager:	**Date/Initial:**

Note to Contractor: If the Contractor fails to complete the above stated warranty work as required by the Contract Documents, the District shall correct the deficiency at the Contractor's expense. Contractor shall reimburse the District for all costs associated with the work.

SECTION 3: "RESPONSE" TO COLLEGE [Bernards to complete]

_____ complete _____ incomplete (re-work required)

Verified By: _____ **Date:** _____
Project Manager (name of individual)

Comments:

Note to Department: Department to confirm work is complete. If work is not complete, contact Project Manager.

FORM "AA"

c/o Chaffey College
5885 Haven Avenue
Rancho Cucamonga, CA 91737-3002
Telephone: 909-652-6701
Fax: 909-652-6704
http://www.chaffey.edu/purchasing

Chaffey College

NOTICE OF COMPLETION REQUEST FORM/ RETENTION RELEASE

Date:

Bid No.:
DSA No.:
Project: Contract No.:

To: Kim Erickson
Purchasing Services

FROM:

Vendor:

CONTRACT DURATION:
Commencement:
Completion:

Actual Completion Date:

Location:

Waiver and Liens:

Warranties, O & M Manuals, As-builts:

Retention Release:
Stop Notice: See page 2 for breakdown. Total: $ -
Claims: See page 2 for breakdown. Total: $ -
Final Retention Held:

TOTAL $ -

REMARKS: Please prepare a Notice of Completion for the above project.

Thank you,

Budget Code:		Approvals:		Date:
		6	Approval -Lisa Bailey-Assoc. Supt. Bus. Svcs. & Econ Dev.	
Budget Comments:		5	Project Controller - Myriam Arellano	
		4	Program Approval - Melanie Siddiqi, Assoc. Supt. Admin. Svcs.	
Available Funds:		3	Program/Construction Manager	
		2	Requestor -	
Date:		1		

Chaffey College
c/o Chaffey College
5885 Haven Avenue
Rancho Cucamonga, CA 91737-3002
Telephone: 909-652-6701
Fax: 909-652-6704
http://www.chaffey.edu/purchasing

STOP NOTICE:	List	Amount
	None	
	Total Stop Notices:	**$ -**

CLAIMS:	List	Amount
	None	
	Total Claims:	**$ -**

TABLE OF CONTENTS

DIVISION 08 - OPENINGS

DIVISION 09 - FINISHES

DIVISION 10 - SPECIALTIES

DIVISION 11 - EQUIPMENT

DIVISION 12 - FURNISHINGS

DIVISION 14 - CONVEYING EQUIPMENT

DIVISION 21 - FIRE SUPPRESSION

DIVISION 22 - PLUMBING

2

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING(HVAC)

DIVISION 25 - INTEGRATED AUTOMATION

DIVISION 26 - ELECTRICAL

END OF TABLE OF CONTENTS

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

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. Structural steel.
   2. Grout.

B. Related Sections:
   1. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
   2. Division 05 Section "Metal Fabrications" for miscellaneous steel fabrications and other metal items not defined as structural steel.
   3. Division 05 Section "Metal Stairs."
   4. Division 09 painting Sections and Division 09 Section "High-Performance Coatings" for surface-preparation and priming requirements.

1.03 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SFRS" or elements along grid lines designated as "SFRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:
   1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
   2. Welded built-up members with plates thicker than 2 inches (50 mm).
   3. Column base plates thicker than 2 inches (50 mm).

D. Protected Zone: Structural members or portions of structural members of the SFRS indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:
   1. Product Data for MR Credit 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Laboratory Test Reports for IEQ Credit 4.2: For primers, 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", including 2004 Addenda.

C. Shop Drawings: Show fabrication of structural-steel components.
   1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
   2. Include embedment drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
   4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
   5. Identify members and connections of the seismic-load-resisting system.
   6. Indicate locations and dimensions of protected zones.
   7. Identify demand critical welds.

D. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing. For demand critical welds include the following:
   1. One or more combination of welding variables (e.g. power source, volt, amp, travel speed, etc.) that produces heat input within the range used for the WPS Heat Input Envelope Test.
   2. Electrode manufacturer and trade name.

E. Mock-ups: Where indicated in architectural drawings, for steel exposed to view in the completed structure, construct mockups for each form of construction and finish required to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
   1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
   2. Notify Architect one week in advance of the dates and times when mockups will be constructed.
   3. Demonstrate the proposed range of aesthetic effect and workmanship of steel surfaces and welded and bolted connections.
      a. Coordinate finish-painting requirements of mockups with Division 09 Section "Painting."

4. Obtain Architect's approval of mockups before start of final unit of Work.
5. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   a. When directed, demolish and remove mockups from Project site.
   b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

F. Source quality-control reports.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that ~~participates in~~ follows the requirements of ~~the AISC Quality Certification Program and is designated an AISC Certified Plant, Category STD.~~ All requirements of the 2019 CBC shall apply. 2

B. Installer Qualifications: A qualified installer who ~~participates in~~ follows the requirements of ~~the AISC Quality Certification Program and is designated an AISC Certified Erector, Category ACSE.~~ All requirements of the 2019 CBC shall apply. 2

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

D. Comply with applicable provisions of the following specifications and documents:
1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 358.
4. AISC 360.

5. RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
6. AWS D1.1/D1.1M.
7. AWS D1.8/D1.8M.

E. Preinstallation Conference: Conduct conference at Project site.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
1. Fasteners may be repackaged provided Owner's Testing Agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.08 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:
1. W-Shapes: 60 percent.
2. Channels, Angles, M, S-Shapes: 60 percent.
3. Plates and Bars: 25 percent.
4. Cold-Formed Hollow Structural Sections: 25 percent.
5. Steel Pipe: 25 percent.
6. All Other Steel Materials: 25 percent.

B. W-Shapes: ASTM A 992/A 992M.

C. Channels, Angles, M-, S-Shapes: ASTM A 36/A 36M.

D. Plates and Bars: ASTM A 36/A 36M, typical; ASTM A 572/A 572M, Grade 50, when used in SLRS connection.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade C typical & ASTM A1085 where specifically indicated.

F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
   1. Finish: Black [except where indicated to be galvanized].

G. Welding Electrodes: Comply with AWS requirements.

H. Structural Steel Surfaces: For fabrication of work which will be exposed to view in the completed structure, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

2.02 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish; where indicated on Drawings.
   1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.
   1. Finish: Hot-dip or mechanically deposited zinc coating. All threaded components of the fastener assembly must be galvanized by the same process. Mixing high-strength bolts that are galvanized by one process with nuts that are galvanized by the other is not permitted.
   2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex or round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Plain.

E. Shear Connectors: ASTM A 29, Grades C1010 through C1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Headed Anchor Rods: ASTM F 1554, Grade 36, typical; ASTM F 1554, Grade 55, weldable, when used in SFRS; straight.
1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
4. Finish: Plain.

G. Threaded Rods: ASTM A 36/A 36M.
1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
3. Finish: Plain.

H. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.03 PRIMER

A. Low-Emitting Materials: Paints and coatings 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”, including 2004 Addenda.

B. Primer: Comply with Division 09 painting Sections and Division 09 Section "High-Performance Coatings."

C. Primer: SSPC-Paint 25, Type II, zinc oxide, alkyd, linseed oil primer.

D. Galvanizing Repair Paint: ASTM A 780.

2.04 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.05 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.

3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

H. Steel that will be exposed to view in the completed structure:
1. The fabricator shall handle the steel with care to avoid marking or distorting the steel members:
   a. Slings shall be nylon type or chains or wire rope with softeners.
   b. Care shall be taken to minimize damage to any shop paint or coating.
   c. Tack welds, temporary braces, backing, and fixtures used in fabrication shall be shown in the fabrication documents.
   d. When temporary braces or fixtures are required during fabrication or shipment, or to facilitate erection, care shall be taken to avoid blemishes or unsightly surfaces resulting from the use or removal of such temporary elements.
   e. Tack welds not incorporated into final welds shall be treated consistently with requirements for final welds.
   f. All backing and runoff tabs shall be removed and the welds ground smooth.
   g. All bolt heads in connections shall be on the same side and consistent from one connection to another.
2. Members fabricated of unfinished and galvanized steel shall not have erection marks, painted marks or other marks on surfaces in the completed structure.

3. The permissible tolerances for member depth, width, out of square, and camber and sweep shall be as specified in ASTM A6 and ASTM A500.
4. Weld spatter exposed to view, if any, shall be removed.
5. Weld projection up to 1/16 in (2mm) is acceptable for butt and plug welded joints.
6. Weld show-through shall be acceptable as produced.
7. Surface shall be prepared to meet the requirement of SSPC-SP 6. Prior to blast cleaning:
   a. Grease or oil, if any is present, shall be removed by solvent cleaning to meet the requirements of SSPC-SP 1.
   b. Weld spatter, slivers, and similar surface discontinuities shall be removed.
   c. Sharp corners resulting from shearing, flame cutting, or grinding shall be eased.
8. Seams of hollow structural sections shall be acceptable as produced.
9. Delivery of Materials: The standard for acceptance of delivered and erected members shall be equivalent to the standard employed at fabrication. Fabricator shall use special care to avoid bending, twisting or otherwise distorting steel members that will be exposed to view in the completed structure. All tie downs on loads shall be nylon straps or chains with softeners to avoid damage to edges and surfaces of members.

2.06 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened unless noted otherwise on Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.07 SHOP PRIMING

A. Shop prime steel surfaces except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
   2. Surfaces to be field welded.
   3. Top flange of beams supporting steel decking.
   4. Surfaces to be high-strength bolted with slip-critical connections.
   5. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
   6. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. SSPC-SP 2, "Hand Tool Cleaning."
   2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.08 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
   1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Determine, furnish and install all temporary supports, such as temporary guys, beams, braces, falsework, cribbing or other elements required for the erection operation. These temporary supports shall be sufficient to secure the bare structural steel framing or any portion thereof against loads that are likely to be encountered during erection, including those due to wind and those that result from erection operations. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.03 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

4. On welded construction exposed to view or weather, remove erection bolts, fill holes with plug welds or filler and grind smooth at exposed surfaces.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

I. Steel members that will be exposed to view in completed structure: The erector shall use special care in unloading, handling and erecting steel members that will be exposed to view in the completed structure to avoid marking or distorting. The erector shall plan and execute all operations in such a manner that allows the appearance of these members to be maintained:
1. Slings shall be nylon type or chains or wire rope with softeners.
2. Care shall be taken to minimize damage to any shop paint or coating.
3. When temporary braces or fixtures are required to facilitate erection, care shall be taken to avoid any blemishes, holes or unsightly surfaces resulting from the use or removal of such temporary elements.
4. Tack welds not incorporated into final welds shall be ground smooth.
5. All backing and runoff tabs shall be removed and the welds ground smooth.
6. All bolt heads in connections shall be on the same side and consistent from one connection to another.

3.04 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened unless noted otherwise on Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
   2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
   3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.05 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent Testing Agency to inspect field welds and high-strength bolted connections and prepare test reports.

B. Inspections: Verify and inspect structural steel Work as shown on Drawings.

C. Bolted Connections: Bolted connections will be tested and inspected according to RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
   1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at Testing Agency's option:

      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
      c. Ultrasonic Inspection: ASTM E 164.

E. SFRS Connections: Test and inspect SFRS connection elements as indicated in accordance to AISC 341, AWS D1.1/D1.1M and AWS D1.8/D1.8M.

F. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
   1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Testing Agency, where warranted, may select a reasonable number of additional studs to be subjected to the bend tests.

G. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.06 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated ferrous metal items, galvanized and prime painted.

B. Stainless steel metal items.

C. Aluminum metal items.

D. Related Sections:
1. Section 05 52 00, Handrails and Railings.
2. Section 09 90 00, Painting.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. American Society of Mechanical Engineers (ASME)
1. ASME B18 -Fasteners

C. ASTM International
1. ASTM A36/A36M Carbon Structural Steel
2. ASTM A48/A48M Gray Iron Castings
3. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless
4. ASTM A123 Zinc (Hot-Dip Galvanized) on Coatings on Iron and Steel Products
5. ASTM A153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware
6. ASTM A240 Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.
7. ASTM A276 Stainless Steel Bars and Shapes
8. ASTM A283/A 283M Low and Intermediate Tensile Strength Carbon Steel Plates
9. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
10. ASTM A325 - Structural Bolts, Steel, Heat Treated, 120/105ksi Minimum Tensile Strength
11. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes
12. ASTM A513 - Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
13. ASTM A563 - Carbon and Alloy Steel Nuts
14. ASTM A653/A 653M Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
15. ASTM A666 Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar (non magnetic).

16. ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
17. ASTM A786/A 786M Rolled Steel Floor Plates
18. ASTM A793 Rolled Floor Plate, Stainless Steel.
19. ASTM A992 Structural Steel Shapes
20. ASTM B26 Aluminum-Alloy Sand Castings
21. ASTM B308 Aluminum-Alloy 6061-T6 Standard Structural Profiles
22. ASTM B209/B209M Aluminum and Aluminum-Alloy Sheet and Plate
23. ASTM B221/B221M Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
24. ASTM B455 Copper-Zinc-Lead Alloy (Leaded Brass) Extruded Shapes
25. ASTM B632/B632M Aluminum-Alloy Rolled Tread Plate
26. ASTM B633 - Electrodeposited Coatings of Zinc on Iron and Steel
27. ASTM C1107 - Packaged Dry Hydraulic - Cement Grout (Non-Shrink
28. ASTM D520 ASTM D520 - Zinc Dust Pigment
29. ASTM F 593 - Stainless Steel Bolts, Hex Cap Screws, and Studs
30. ASTM F 594 Stainless Steel Nuts
31. ASTM F 738M Stainless Steel Metric Bolts, Screws, and Studs
32. ASTM F 836M Stainless Steel Metric Nuts
33. ASTM F1554 - Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

D. American Welding Society (AWS)
1. AWS A2.4 - Standard Symbols for Welding, Brazing and Non-Destructive Examination
2. AWS A5.1 - Carbon Steel Covered Arc-Welding Electrodes

E. ASCE/SEI 7-16 - American Society of Civil Engineers, Structural Engineers Institute, ASCE Standard.

F. California Code of Regulations (CCR)
1. Title 8, Chapter 3.2
2. Title 8, Division 1, Subchapter 7, Group 1, Article 4, Section 3277, Fixed Ladders
3. Cal/OSHA, Subchapter 4 Construction Safety Orders
4. Title 24, Part 2, 2019 California Building Code (CBC), Chapter 22A.
5. Title 24, California Fire Code Chapter 35 Welding and Other Hot Work.

G. National Ornamental & Miscellaneous Metals Association (NOMMA)
1. NOMMA Guidelines - Guideline 1 Joint Finishes

H. SSPC - The Society for Protective Coatings
1. Paint 20 - Zinc-Rich Coating (Type 1 Inorganic and Type II Organic)
2. SP-2 - Steel Preparation

I. MIL - Military Specifications, United States Department of Defense
1. P-21035 - Paint, High Zinc Dust Content, Galvanizing Repair

J. MPI - Master Painters Institute Approved Products List
1. 18 - Primer, Zinc Rich, Organic
2. 19 - Primer, Zinc Rich, Inorganic

1.03 SUBMITTALS

A. Shop Drawings. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories. Include erection drawings, elevations and details where applicable. Indicate welded connections using standard AWS A2.4 Welding Symbols. Indicate net weld lengths.

B. Welder Certifications.

C. Manufacturer's Certificates certifying welders employed on the work have been AWS qualified within the previous 12 months, in accordance with AWS-WHB-1.

D. Written Welding Procedure Specification (WPS)

1.04 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following
1. AWS D1.1, Structural Welding Code--Steel.
2. AWS D1.3, Structural Welding Code--Sheet Steel.
3. AWS D1.8, Structural Welding Code – Seismic Supplement.
4. AWS Certified welders.
5. AWS D1.6, Structural Welding Code--Stainless Steel.
6. AWS D1.2, Structural Welding Code--Aluminum.
7. AWS - American Welding Society
8. AWS A2.4 Standard Symbols for Welding, Brazing and Non Destructive Examination
9. DSA-Projects: All welding shall be specially inspected by an AWS-CWI Qualified Inspector.

B. Coating applicator - Galvanized Metal Fabrications: Company specializing in hot-dip galvanizing after fabrication and following the procedures in the Quality Assurance Manual of the American Galvanizers Association.

1.05 FIELD MEASUREMENTS

A. Verify field measurements.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.02 FERROUS METALS

A. Steel Sections: ASTM A992 for W-Shape sections and ASTM A36 for all other members.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Bending or cold-formed steel: ASTM A283, Grade C.

D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars ASTM A666, Type 304L, No. 4 satin finish, 16 gauge minimum, unless otherwise indicated.

E. Stainless-Steel Sheet, Strip, Plate, and Flat Bars ASTM A240, Type 304L, Commercial Grade No. 4 finish, 16 gauge minimum, unless otherwise indicated. Stretcher-leveled standard of flatness for countertops.

F. Stainless-Steel Bars and Shapes ASTM A276, Type 304L.

G. Rolled-Stainless-Steel Floor Plate ASTM A793.

H. Steel Round Structural Tubing: ASTM A500, Grade C, minimum yield strength, 46 ksi.

I. Structural Tubing: Hollow Structural Sections (HSS), ASTM A500, Grade B, minimum yield strength, 42 ksi.

J. Pipe: ASTM A53, Grade B, Type E or S, Schedule 40, galvanized where indicated.

K. Cast Iron: ASTM A48/A48M, Class 30, unless another class is indicated or required by structural loads.

L. Cast steel: ASTM A27, Grade 65-35.

M. Square and rectangular steel tubing structural: carbon steel conforming to ASTM A500 or ASTM A36.

N. Mechanical Tubing: ASTM A 513 hot- or cold-rolled carbon steel for non-structural tubing, electric welded tubing.

2.03 NONFERROUS METALS

A. Aluminum Standard Structural Profiles: ASTM B308, Alloy 6061-T6.

B. Aluminum Plate and Sheet ASTM B209/, Alloy 6061-T6.

C. Aluminum Extrusions ASTM B221/, Alloy 6063-T6.

D. Aluminum-Alloy Rolled Tread Plate ASTM B632/B632M, Alloy 6061-T6.

E. Aluminum Castings ASTM B26/B26M, Alloy 443.0-F.

2.04 FASTENERS

A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563 and ANSI B18.2.1; and, where indicated, flat washers and ASTM A325 as indicated on drawings.

C. Stainless-Steel Bolts and Nuts - Corrosion Grade: Regular hexagon-head annealed stainless steel bolts, nuts and, where indicated, flat washers; ASTM F593 for bolts and ASTM F594/ for nuts, Alloy Group 1 [Group 2].
   1. Stainless Steel Fastenings and Fittings at Food Preparation areas:
      a. Bolts and screws with countersunk flat heads at interior and exterior visible or accessible surfaces.
      b. Use concealed fastenings where possible.

D. High Strength Bolts ASTM A325.

E. Anchor Bolts ASTM F1554, Grade 36.

F. Machine Screws ASME B18.6.3.

G. Lag Bolts ASME B18.2.1.

H. Wood Screws Flat head, carbon steel, ASME B18.6.1.

I. Plain Washers Round, carbon steel, ASME B18.22.1.

J. Lock Washers Helical, spring type, carbon steel, ASME B18.21.1.

K. Eyebolts: for wood, steel or concrete construction, Stainless steel Type 304. 1/4" shoulder pattern, rated 500 lbs. minimum. Epoxied in Concrete where indicated.

L. Threaded rods, steel yokes and plates.

M. Self-drilling, self-tapping screws, ASTM C954, galvanized, minimum #10 unless noted otherwise on drawings. By Buildex/Tomarco or equal.

N. Anchorage Devices, Drilled Expansion Anchors Minimum 5/8-inch diameter with 3 inch embedment unless noted otherwise on drawings. Allowable shear and tension values as permitted in ICC-ES, ESR-1917 Hilti Kwik Bolt TZ Concrete Anchor or Hilti Kwik Bolt 3, ESR-1385 for masonry anchors, by Hilti Inc., Tulsa, OK, or in ICC-ES 2502, DeWalt Power-Stud+SD2 concrete anchor or DeWalt Power-Stud+ SD1, ESR-2966 for masonry anchors, by Dewalt, Towson, MD.

2.05 MISCELLANEOUS MATERIALS

A. Shop Primer: Fabricator's rust inhibitive primer suitable for finish scheduled in Section 09 90 00 equal to L69 Hi Build Epoxoline II @ 3-4 mils DFT primer, red color, air dried, by Tnemec.

B. Galvanizing Repair Compound: ASTM D520 Type III, MIL-P-21035, SSPC-Paint 20, or MPI #18 or 19. Touch-Up products for Galvanized Surfaces Ready mixed Zinc rich galvanizing compound, 95% zinc.

1. Finish: Galvilite by ZRC Products Company, Marshfield, MA or equal. Reflective Metallic Sheen for exposed galvanized finish.
2. Finish: ZRC Products Company, Marshfield, MA or equal. Primer for repaired galvanized to receive a painting finish.

C. Zinc-Based Solders/Alloys: Solder Zinc Alloy for Repair ASTM A780 Annex A1; Welco Gal-Viz self-fluxing solder alloy, Galvalloy, Galvabar or equal, ASTM A780, paragraph A1. Repair Using Zinc-Based Alloys.

D. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

E. 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 8,000 psi at 7 days; of consistency suitable for application and a 30 minute working time.

F. Safety Stair Nosings: At stairs and landings as indicated, aggregate integral warning stripe extruded aluminum, 2" inches wide Model H-225 by Balco Inc., Wichita Kansas, or Type WP 24A Wooster Products Inc., Wooster, OH. Provide 2" strip in contrasting color (70 percent contrasting) full width of step, 1" maximum from edge of nosing of each exterior tread and top landing (upper approach), and top and bottom steps of interior stairs unless nosings are indicated at all steps in drawings. Colors to be selected by Architect.

2.06 FABRICATION

2

A. Fit and shop assemble in largest practical sections for delivery to site.

B. Ease exposed edges to small uniform radius.

C. Fabricate items with joints tightly fitted and secured.

D. Welded Joints. Seal joined members by continuous welds. Dress welded joints, leaving no burrs, or sharp or abrasive corners, edges or surfaces.
1. Where exposed to view, dress welds in accordance with NOMMA Guidelines for Finish 1.
2. Where concealed, dress welds in accordance with NOMMA Guidelines for Finish 3.

E. Exposed Mechanically Fastened Joints. Make exposed, mechanically fastened joints hairline-tight, flush, butt joints. Secure with flush-mount, countersunk, screws or bolts; unobtrusively located; consistent with design of component, except where specifically indicated otherwise.

F. Provide components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as related metal fabrication, unless expressly indicated otherwise.

2.07 FINISHES

A. Steel and Iron
1. Clean surfaces of rust, scale, grease and foreign matter prior to finishing. Prepare in accordance with SSPC SP-2.
2. Galvanize steel items to zinc coating thickness in accordance with ASTM A123, minimum Coating Grade 80 (1.9 oz/sq. ft.). Surfaces shall be free of icicles, spangles and puddling. Provide venting holes at all enclosed sections, "V" notch, and drilled holes are acceptable. Locate to prevent rainwater from entering enclosed sections at exterior galvanized items. For sheet steel items, galvanize per ASTM A653 G60 Coating Designation.
3. Galvanized items to be painted: Do not use quenching solutions or treatments immediately after galvanizing. Refer to individual sections for galvanized items to be painted and to Section 09 90 00.
4. Do not prime surfaces in direct contact with concrete or where field welding is required.
5. For painted surfaces, prime items with two coats in accordance with requirements of primer specified herein.
6. Color Coated with Finish Special Coatings in accordance with Section 09 90 00 Painting for exposed surfaces.

B. Stainless Steel Finishes
1. Remove tool and die marks and stretch lines or blend into finish.
2. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
3. Bright, Directional Satin Finish No. 4.

C. Aluminum
1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Class I, Clear Anodic Finish AA-M12C22A41 (Mechanical Finish nonspecular as fabricated; Chemical Finish etched, medium matte; Anodic Coating Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

D. Apply two coats of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious materials or between dissimilar metals. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Do not begin installation until unsatisfactory conditions are corrected. Beginning installation means acceptance of existing conditions including the preparatory work of others, if any.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Allow for erection loads and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on shop drawings.
   1. Weld joints using shielded metal-arc welding (SMAW) method. Use coated welded rods, not fluxed, or type recommended by manufacturer for use with parent metal. Use only certified welders for structural construction.
   2. Grinding: Grind welds on surfaces subject to traffic or contact to smooth flush joints.
   3. Peening: Remove flux and weld spatter as necessary to eliminate unsightly conditions and grind off sharp projections.
   4. Permanently Concealed Welds: No treatment required other than preparation for painting or galvanizing.

D. Perform field welding in accordance with AWS standards and procedures for metal alloy welded.

E. Obtain Architect approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions and surfaces not shop primed except surfaces to be in contact with concrete.

G. Repair of Galvanized Surfaces: Ready mixed, zinc-rich galvanizing compound, ASTM A780 - A2. Repair Using Paints Containing Zinc Dust, minimum thickness 5 mils.

H. Repair of Galvanized Surfaces: ASTM A782 Annex A1, apply Gal-Viz while metal is still hot. Tin surface with Gal-Viz with wire brush. Do not direct flame on alloy. Minimum thickness, 5 mils.

I. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   1. Cast Aluminum: Heavy coat of alkali-resistant bituminous paint.
   2. Extruded Aluminum: Two coats of clear lacquer.

3.04 ERECTION TOLERANCE

A. Maximum Variation From Plumb 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment 1/4 inch.

3.05 FINISHES

A. Paint with Gloss Polyurethane High Performance Coatings in Special Coatings per Section 09 90 00 Painting.

3.06 SCHEDULE

A. Schedule is list of principal items only. Refer to Drawing details for items not specifically scheduled.

B. Fasteners: Provide fasteners and connectors of approved types, whether indicated or not.

C. Interior Vertical Access Ladder: minimum 16 inch ID wide tread surface on rungs.
   1. Side Rails: 3/8 inch by 2 inch steel bar.
   2. Rungs: 3/4-inch diameter solid steel rod spaced 12 inches on center vertically with knurled or skid-resistant surface.
   3. Mounting Brackets: 3/8-inch thick L-bent plate 8-1/2-inches by 3-inch legs, 4-inches deep, fabricated to provide 7 inches clearance from wall surface. Furnish steel wall backing plates, brackets, and anchors required for 48 inches, maximum on center spacing.
   4. Ladder safety post: Bilco LadderUP Safety Post Model LU-2, hot-dip galvanized steel or equal, telescoping tubular section with automatic lock when extended. Upward and downward movement controlled by stainless special alloy steel spring balancing mechanism. Secure to ladder rungs with manufacturer's fasteners.
   5. Ladder Safety Device Saf-T-Climb manufactured by North Safety Products or approved equal. Provide according to Code of Federal Regulations 29 CFR 1910.27 and ANSI A14.3.
   6. Cage for Ladder over 20 feet 1/4 by 2 inch hoops at 4 feet on centers, 7-3/16 by 1-1/2 inch vertical bars, solid riveted. Per Title 8, CCR, Construction Safety Orders.
   7. Elevator pit ladders shall have rungs spaced 7 inches from wall .
   8. Finish: paint per Section 09 90 00.

D. Miscellaneous Framing and Supports , Equipment Enclosures and as indicated on Drawings..
   1. Provide steel framing, or aluminum framing if indicated, and panels and supports as indicated in Drawings and as necessary to complete Work.
   2. Fabricate units from structural or hollow steel shapes, plates, structural supports, sheet metal and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   3. Hinges: Heavy-duty weld-on l type. Minimum 3 per leaf rated at 1000 lbs. each hinge.
   4. Enclosures and Gates As indicated on Drawings:
      a. Refer to Section 07 46 21, Equipment Screens.
   5. Refer to drawings for custom fabrication per details.

E. Railing and Handrails as detailed, refer to Section 05 52 00 for additional requirements.

END OF SECTION

SECTION 07 21 00

INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Thermal insulation in all exterior wall construction.

B. Sound attenuation insulation in all interior partition construction.

C. Related Requirements:
1. Energy calculations or prescriptive compliance documents.
2. Section 01 35 42, CALGreen Requirements.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM - American Society for Testing and Materials
1. ASTM C 165 - Test Method for Measuring Compressive Properties of Thermal Insulations
2. ASTM C 356 - Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat
3. ASTM C 612 - Mineral Fiber Block and Board Thermal Insulation
4. ASTM C 665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
5. ASTM C 1104 - Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation
6. ASTM C 1304 - Test Method for Assessing the Odor Emission of Thermal Insulation Materials
7. ASTM C 1338 - Test Method for Determining Fungi Resistance of Insulation Materials and Facings
8. ASTM D 816 - Rubber Cements
9. ASTM E 84 - Surface Burning Characteristics of Building Materials
10. ASTM E 96 - Test Methods for Water Vapor Transmission of Materials
11. ASTM E 136 - Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

C. CBC - 2019 California Building Code
1. CBC-7 - CBC Chapter 7, Fire and Smoke Protection Features.
2. Section 120, in conformance with ASTM E-84 or UL 723-Standard for Test for Surface Burning Characteristics of Building Materials.

D. 2019 California Energy Code, Title 24, Part 6, Subchapter 3, Section 140.3.

E. California Green Building Standards Code, CALGreen - 2019.

F. SCAQMD - South Coast Air Quality Management District Regulations Rule 1168 Adhesive and Sealant Applications.

1.03 PERFORMANCE REQUIREMENTS

A. Materials shall provide continuity of thermal barrier at building enclosure elements.

B. Materials shall provide continuity of sound barrier at designated room enclosure elements.

C. Materials shall conform to Section 720 Thermal and Sound Insulating Requirements, California Building Code and Section 110.8 California Energy Code.

D. Thermal Resistance: R values to achieve overall assembly U-Factor no greater than applicable value in Table 140.3-B California Energy Code unless noted otherwise in T-24 Energy Report.

1.04 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria and methods of installation.

B. Three samples of each material specified minimum 12 inches square. Provide fasteners, clips and other accessories.

C. Certification of Compliance with Section 110.8(a) California Energy Code, 2019 and Part 12, Title 24,CCR Standards for Insulating Materials Chapter 12-13, Section 12-13-1555.

D. CALGreen Submittals:
1. Product Data Sheets and Declaration Statements showing compliance with CALGreen Code per 1.05.B.

1.05 QUALITY ASSURANCE

A. Provide U-value limits in accordance with Section 140.3, Table 140.3-B of 2019 California Energy Code, Title 24 Part 6 California Code of Regulations.

B. California Green Building Standards Code, CALGreen - 2019.
1. Adhesives, sealants, primers, and caulks shall comply with air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, per CALGreen Tables 5.504.4.1 and 5.504.4.2.
2. Paints and Coatings shall comply with VOC limits in Table 1 of the ARB, per CALGreen Table 5.504.4.3.
3. Recycled Content: requirements per Section A5.405.4 CALGreen code.
4. Adhesives shall comply with VOC content limits defined by SCAQMD Rule 1168.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
   1. Johns Manville Insulations, Commercial/Industrial Division, Denver, CO.
   2. Certainteed Corporation, Valley Forge, PA.
   3. Owens - Corning, Toledo, OH.

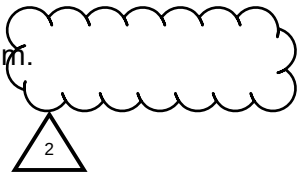
B. Or equal as approved in accordance with Division 01, General Requirements for Substitutions.

2.02 MATERIALS - THERMAL

A. Batt Insulation: ASTM C665, Type III, Class A, Category 1. Preformed, foil faced, formaldehyde-free glass fiber batt insulation, with tabs, Johns Manville FSK-25, or equal. Conforming to following:
   1. Thermal Resistance: R values to achieve overall assembly U-Factor no greater than applicable value in Table 140.3-B CEC unless noted otherwise in T-24 Energy Report.
   2. Batt Size: As required to fully fill cavity width and height or length.
   3. Thickness: As required to meet specified R-value without compression.
   4. Facing: Faced on one side with flame resistant foil facing.
   5. Flame Spread: Less than 25, ASTM E 84.
   6. Smoke Developed Rating: Maximum 50, ASTM E 84.
   7. Permeance: 0.05 perms, ASTM E 96.

2.03 MATERIALS - SOUND

A. Sound Attenuation Insulation: ASTM C665, Type I; preformed glass fiber, formaldehyde-free, "Sound Control Batts", acoustical fiber glass insulation, by Johns Manville or equal. Conforming to the following:
   1. Size: As required to fully fill cavity width and height.
   2. Thickness: 3-5/8" for 4" walls and 6-1/2" for 6" walls, minimum.
   3. Facing: Unfaced.
   4. Flame Spread: Less than 25, ASTM E84.
   5. Smoke Developed Rating: Maximum 50.
   6. Formaldehyde-free.



2.04 ACCESSORIES

A. Fasteners, type and size to suit application.

B. Tape: Acrylic with Polypropylene backing, Class A, flame spread less than 25, adhering type, 2-1/2 inch wide; No. 8087 Contractor's Seaming Tape, manufactured by 3m Company, St. Paul, MN, or equal as approved in accordance with Division 01, General Requirements for substitutions.

C. Insulation Fasteners: Steel impale spindle and clinch shield on flat metal base with applied adhesive, length to suit insulation thickness, capable of securely and rigidly fastening insulation in place; INSUL-ANCHORS, manufactured by Gemco, Dansville, OH, or equal as approved in accordance with Division 01, General Requirements for substitutions. Self-adhesive base plates are prohibited.

D. Adhesive: Tuff Bond Hanger Adhesive manufactured by Gemco, Dansville, OH, or equal as approved in accordance with Division 01, General Requirements for Substitutions.

E. String wire: Minimum 16 gauge galvanized annealed steel wire spaced at 18" on center.

F. Do not use salvage cut-offs, materials less than space width, or in multiple short lengths to fill-in the gaps.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify that substrate and adjacent materials are satisfactorily installed and in place and are ready to receive insulation.

3.02 INSTALLATION

A. Install insulation in accordance with insulation manufacturer's instructions.
   1. Clean tracks prior to installation.

B. Install in cavities designated to receive sound thermal insulation without gaps or voids. Extend material full height of cavity.

C. Cut insulation to fit tightly at cavities between studs not standard 16 inches on center spacing.

D. Trim insulation neatly to fit spaces.

E. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

F. Extend thermal materials full height of cavity to structure above and as otherwise required to produce a completely insulated building envelope.

G. Extend sound materials full height of cavity to structure above and as otherwise required to produce a completely sound insulated enclosure.

H. Tape and seal [butt ends, lapped flanges, and] tears or cuts in foil in thermal batts.

I. Friction fit semi-rigid sound insulation batts in cavities, no gaps voids permitted.

J. Metal Framing: Place foil side of thermal batts toward inside of building. Place insulation fasteners at 36 inches on centers, vertically in two rows at each stud cavity. Tape and seal tears or cuts in foil.

K. Install material to preclude slipping from place by use of nails, screws, wires or other approved fastening devices.

L. Where tight, congested, difficult or otherwise unforeseen conditions are encountered, employ alternate application methods or materials to effect the intended insulation system. Alternate methods or materials shall be submitted to Architect for review and approval..

3.03 INSPECTION

A. Notify Project Inspector before Work is covered. Approval by Project Inspector shall be received before any Work is concealed. Work that has been covered prior to inspection and approval shall be uncovered for inspection and recovered.

END OF SECTION

SECTION 07 26 16

VAPOR BARRIER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Installation of Vapor Barrier under concrete slabs.

B. Related Sections:
1. Section 03 30 00, Cast-In-Place Concrete.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. SCAQMD - South Coast Air Quality Management District - Rule 1113.

C. ASTM D 882 - Tensile Properties of Thin Plastic Sheeting.

D. ASTM D 1709 - Impact Resistance of Plastic Film by the Free-Falling Dart Method.

E. ASTM D 4833 - Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

F. ASTM E 96 - Water Vapor Transmission of Materials.

G. ASTM E 154 - Water Vapor Retarders Used in Contact with Earth under Concrete Slabs, on Walls, or as Ground Cover.

H. ASTM F 1249 - Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

I. ASTM E 1643 - Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

J. ASTM E 1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.03 SUBMITTALS

A. Product Data: For membrane materials and accessories.

B. Third party documentation that all testing was performed on a single production roll per ASTM E 1745 Section 8.1.

C. Manufacturer's Installation Instructions.

1.04 QUALITY ASSURANCE

A. Membrane Manufacturer: Company specializing in high strength density polyethylene use as vapor barrier with five years minimum experience.

B. Applicator: Company specializing in application of specified vapor barrier with three years minimum experience and approved by manufacturer.

C. Regulatory Requirements
1. Conform to AQMD, Local Regulation. Copies of document are available at Architect's office.

D. Field Sample
1. Approved sample may be incorporated as part of Work.

E. Manufacturer Review
1. Contact vapor barrier manufacturer for pre-construction meeting and/or to coordinate a review of the vapor barrier installation either by digital review or in person.
2. Contractor shall obtain written approval of installation of Vapor Barrier from manufacturer's representative prior to covering. Contractor shall submit copy of approval to the Architect and Commissioning Agent.

2

1.05 ENVIRONMENTAL REQUIREMENTS

A. Do not apply vapor barrier membrane when air temperature is below 50 degrees F.

1.06 WARRANTY

A. Provide manufacturer's limited 1 year warranty.

B. Warranty: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

C. Warranty: Include coverage of waterproofing failure to resist penetration of water except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered as structural failure.

D. Be responsible for removal and replacement of materials concealing waterproofing.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
1. Stego Industries LLC, San Juan Capistrano, CA; Product: 15 Mil Stego Wrap.
2. W.R. Meadows, Pomona, CA.; Product: Perminator 15 Mil
3. Reef Industries, Inc. Houston, TX. Product: Vaporguard.

B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.02 MATERIAL

A. Physical Properties:
1. Puncture Resistant Results, ASTM D1709: 2266 grams, min. Water Vapor
2. Transmission Rate, ASTM F 124: 0.0036 WVTR
3. Permeance (New Material), ASTM F 1249: 0.0086 perms
4. Permeance (After Conditioning Tests Per Section 7.1), ASTM E1745: Less than 0.010 perms.
5. Tensile Strength, ASTM E 1745: 70.6 pounds force per inch.
6. Performance Class, ASTM E 1745: Class A

2.03 ACCESSORIES

A. Seam Tape
1. Tape must have the following qualities:
a. Water Vapor Transmission Rate, ASTM E 96: 0.03 perms or lower
b. As approved by the vapor barrier manufacturer.

B. Proofing Mastic
1. Mastic must have the following qualities:
a. Water Vapor Transmission Rate, ASTM E 96: 0.17 perms or lower
b. As approved by the vapor barrier manufacturer.

C. Perimeter/Terminating Edge Seal (Choose one of the following)
1. Seal edge of vapor barrier to existing foundation wall or grade beam using double-sided adhesive strip with the following qualities:
a. Water Vapor Transmission Rate, ASTM E 96: 0.03 perms or lower
b. As approved by the vapor barrier manufacturer
2. Seal edge of vapor barrier to fresh concrete of slab using a tape with a textured surface that creates a mechanical seal to freshly-placed concrete with the following qualities:
a. Water Vapor Transmission Rate, ASTM E 96: 0.03 perms or lower
b. 180° Adhesion Peel Strength, ASTM D 903: 17.6 lbf/in
c. As approved by the vapor barrier manufacturer

D. Pipe Boots
1. Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer’s instructions.

PART 3 - EXECUTION

3.01 INSPECTION

A. For application under concrete slabs verify with Section 03 30 00 that substrate conditions are ready to receive membrane

B. Verify items that penetrate surfaces to receive waterproofing are securely installed and cleaned.

C. Beginning of installation means acceptance of substrate.

3.02 APPLICATION

A. Install vapor barrier over 4-inches of clean sand (sand equivelent or greater than 30).

B. Apply and seal vapor barrier under concrete slab in accordance with manufacturer's recommended procedures, ASTM E 1643 and per the following:
   1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement.
      a. Install vapor retarders in largest practical widths.
   2. Place sheets contnuous between footngs or foundaton walls, without voids.
   3. Lap vapor barrier over footings and/or seal to foundation walls.
   4. Lap all joints 6 inches minimum. Seal seams as noted below.
   5. Turn down sheeting 12 inches minimum along inside face of perimeter grade beams and/or contnuous perimeter footngs.
   6. Fit sheeting tightly around column, pipe and conduit penetrations. Install standard pipe boot where possible, following manufacturer's instructions.
   7. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utlities.
   8. Seam and Lap Sealing: With adhesive mastic and adhesive sealing tape, seal all seams, edges and penetrations of vapor retarder/barrier.
   9. For adhesive mastic seal, apply adhesive to both surfaces, allow approximately 10 minutes to set up and then press together smoothly and evenly, without gaps or fishmouths, for full contact bond.
   10. For adhesive tape seal, comply with manufacturer's instructions and recommendatons.
   11. Seal all penetratons with both adhesive sealing tape and adhesive mastc.
   12. Seal sheets to concrete footing faces and penetrating components with adhesive mastic or double sided tape as recommended by membrane manufacturer.
   13. Ensure there is no moisture entrapment by vapor retarder due to rainfall or ground water intrusion.
   14. Immediately repair holes in vapor retarder with self-adhesive repair tape.

C. For interior forming and screeding applications, do not use non-permanent stakes driven through the vapor barrier. Install forming and screeding devices per manufacturer’s standard.

3.03 PROTECTION

A. Close off area to prevent unauthorized traffic or work over membrane.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Wall Flashing.
2. Parapet Copings and Flashings.
3. Fascias and scuppers.
4. Roof flashings.
5. Reglets and counterflashing.
6. Roof joint cover flashings.
7. Downspouts and Strainers.
8. Conductor Heads.
9. Gravel Stops.
10. Counterflashings for roof hatches and skylights.
11. Interior Roof Drains.
12. Flashings for electrical conduits, mechanical lines and plumbing water lines roof [and wall] penetrations.
13. Door drips.
14. Equipment Roof Curbs and Flashing.
15. Equipment support stand penetrations.
16. Closures
17. Sill Pan Flashings.
18. Termination Bars.

B. Related Section:
1. Section 01 35 42, CALGreen Requirements.
2. Section 09 90 00, Painting.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. California Building Code 2019 Chapters 14 and 15.

C. California Green Building Standards Code, CALGreen - 2019.

D. American Society for Testing and Materials (ASTM)
1. ASTM A480/A480M- General Requirements for Flat-Rolled Stainless Steel and Heat Resisting Steel Plate, Sheet, and Strip.
2. ASTM A653/A653M-11 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc - Iron Alloy Coated by the Hot-Dip Process
3. ASTM B32 - Solder Metal
4. ASTM D4601 - Asphalt-Coated Glass Fiber Base Sheet Used in Roofing

E. National Roofing Contractors Association (NRCA)
   1. NRCA Manual - Fifth Edition.

F. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
   1. SMACNA Manual - Architectural Sheet Metal Manual, Current Edition

1.03 SUBMITTALS

A. Shop drawings showing material profile, jointing pattern, jointing details, fastening methods and installation details.

B. Product data.

C. CALGreen Submittals:
   1. Product Data Sheets and Declaration Statements showing compliance with CALGreen Code per 1.04.A.

D. Manufacturer's installation instructions.

E. Samples for each type of sheet metal flashing and trim indicated with field-applied color finishes.

1.04 QUALITY ASSURANCE

A. California Green Building Standards Code, CALGreen - 2019.
   1. Adhesives, sealants, primers and caulks shall comply with air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, per CALGreen Tables 5.504.4.1 and 5.504.4.2.
   2. Paints and Coatings shall comply with VOC limits in Table 1 of the ARB, per CALGreen Table 5.504.4.3.

1.05 STORAGE AND HANDLING

A. Stack preformed and pre-finished material to prevent twisting, bending, or abrasion and to provide ventilation.

B. Prevent contact with materials during storage that may cause discoloration, staining or damage.

PART 2 - PRODUCTS

2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M-11, G90.

2.02 ACCESSORIES

A. Fasteners: round head, galvanized steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as flashing metal.

B. Ice Dam Underlayment: 45 mil thick self-adhering high-temperature underlayment, R-Mer Seal by The Garland Company, or equal as approved in accordance with Division 01 for substitutions.

C. Metal Primer: For repair of Galvanized sheet metal, Zinc type, Galvilite by ZRC or equal.

D. Protective Backing Paint: Bituminous.

E. Sealant: Two-component, polyurethane-type specified in Section 07 92 00, Joint Sealants.

F. Solder: ASTM B32; Grade Sn50, flux type and alloy composition as required for use with metals to be soldered. Raw muriatic acid for galvanized steel.

G. Rosin-Sized sheathing paper: Sealtight Red Rosin Paper by W.R. Meadows.

H. Termination Bar: Mill finished Extruded aluminum (6063 alloy) with radius corners.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square and free from distortion or defects. Fabricate all components per SMACNA standards unless more stringent conditions are imposed by the Roofing Contractor, in that case the more stringent conditions shall prevail.

B. Fabricate cleats and starter strips of same material as sheet, interlockable with sheet.

C. Form pieces in longest practical lengths.

D. Hem exposed edges on underside 1/2 inch; miter and seam corners.

E. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

F. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

G. Solder lap seams of all non-moving metal joints and seal other metal joints, rivet to strengthen seam. After soldering, remove flux. Wipe and wash solder joints clean.

H. Fabricate corners from one piece with minimum 18 inch long legs; solder seam for rigidity.

I. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

J. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and break edges.

K. Provide expansion joints for gutters at every 30 feet. Fabricate per SMACNA details.

2.04 FINISH

A. Galvanized finish: ASTM A653/A653M-11, G90.

B. Shop prepare and prime exposed ferrous metal surfaces.

C. Back paint concealed metal surfaces with protective backing paint when in contact with copper, redwood or red cedar.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.

B. Verify membrane termination and base flashings are in place, sealed and secure.

C. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Field measure site conditions prior to fabricating Work.

B. Install starter and edge strips and cleats before starting installation.

C. Install reglets true to lines and levels. For surface-mounted seal top of reglets with sealant.

D. Insert counterflashings into reglets to form tight fit. Seal flashings into reglets with sealant.

E. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.

F. Lock and seal all joints.

G. Apply plastic-cement compound between metal flashings and felt flashings.

H. Install separate layer(s) of metal strips, counter flashings, and aluminum tapes prior to Ice Dam Underlayment installation where adjoining EPDM, TPO, or PVC membranes.

I. Fit flashings tight in place. Make corners square, surfaces true and straight in planes and lines accurate to profiles.

J. Seal metal joints watertight.

3.03 INSTALLATION

2

A. Field Quality Control: Commissioning agent shall provide Contractor a checklist prior to installation of materials and components specified below. Contractor shall verify installation and locations of all materials and components specified below using checklist. Submit copies to Architect and Commissioning Agent.

B. Wall Flashing: Flashing shall be installed in such a manner so as to prevent moisture from entering the wall or to redirect it to the exterior. Flashing shall be installed at the perimeters of exterior door and window assemblies, penetrations and terminations of exterior wall assemblies, exterior wall intersections with roofs, decks, balconies and similar projections and at built-in gutters and similar locations where moisture could enter the wall. Flashings with projecting flanges shall be installed on both sides and the ends of copings, under sills and continuously above projecting trim, Section 1405.3 CBC.
   1. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
   2. Openings Flashing in Frame Stud Construction: Install continuous head, sill, jamb, and similar opening flashings to extend 4 inches beyond wall openings. Install over self-adhesive flashings.
   3. Sealants for penetrations: specified in section 07 92 00 Joint Sealers.
   4. Submit shop drawings showing details for approval and use minimum of 24 gauge galvanized steel, UNO.

C. Parapet Copings and Flashings: Fabricate in minimum 96-inch long, but not exceeding 10-foot long sections. Use minimum 22-gauge galvanized steel. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg Provide all copings and caps of the types and shapes indicated on the Drawings. Install Self-Adhesive Flashing (Ice dam, high temperature) under copings. Build in integral expansion joints allowing for movement of the metal without resulting in distortion of coping or leaks of any kind. Miter corners, seal, and solder watertight. All Work shall be watertight.

D. Copings at top of wall:
   1. Copings: Manufactured coping system consisting of formed metal coping cap in section lengths not exceeding 12 feet, concealed anchorage, concealed splice plates with same finish as coping caps, mitered corner units, and end cap units.
      a. Manufacturers:
         1) R-Mer Edge Coping by The Garland Company.
         2) Or equal in accordance with Division 01, Substitutions
      b. Coping Caps: fabricated from the following exposed metal.
         1) Galvanized Steel: 22-Gauge.
      c. PVDF Finish, Coping Cap Color: As selected by Architect from manufacturer's full range.
      d. Corners: Continuously welded.
      e. Manufacturer's standard transitions, end caps, and attachments.

E. Fascias and Scuppers: Fabricate to detail of 20 gauge galvanized sheet. Apply sealant in all crevices. Fabricate scuppers with 6 inch flanges.

F. Roof Flashings: Provide roof flashings as indicated in drawings and required to complete entire project. Submit shop drawings showing details for approval, use minimum of 24 gauge galvanized steel.

G. Reglets and Counterflashings: Minimum 24 gauge galvanized steel as detailed in drawings, submit shop drawings.
   1. Reglets: For Surface-mounted and imbed applications.
   2. Counterflashings: Over bituminous base flashings.
   3. Counterflashings: Roof mounted mechanical equipment and vent stacks.
   4. Counterflashings: Roof Hatches and Skylights.

H. Roof Joint Cover Flashings: Provide roof joint covers as indicated in drawings. Submit shop drawings showing details for approval and use minimum of 24 gauge galvanized steel. Fabricate tops slope to drain.

I. Refrigerant Plumbing Lines Wall Flashing: Titan Outlet by Airex Manufacturing, Thousand Palms, CA or equal. Size as required to enclose pipes.

J. Downspouts and Strainers: Downspouts shall be 24 gauge, galvanized steel, rectangular unless noted otherwise. Strainers shall be 10 gauge galvanized steel wire basket type. Provide all anchor clips and straps as required for installation. Install a wire basket strainer in all downspouts at gutter level. Rivet and solder flange of downspout to gutters per SMACNA details. Locate downspouts every 30 feet unless otherwise noted on drawing. Provide splash pans. Concrete splash block, Section 03 48 00.
   1. At steel pipe overflow-drain and interior drain pipe leaders install Downspout Nozzle #1770 by JR Smith, Montgomery, Alabama. Nickel bronze with bird screen cast bronze body and flange. Refer to Drawings for pipe sizes and locations of drains and leaders. Minimum pipe size Schedule 40, 4 [6] inches, galvanized.
   2. Downspout Filter: FlowGard by KriStar Enterprises, Inc., Santa Rosa, CA. Model FG-DS4, 4" diameter, box size 14 x 29 x 7.5 inches, dual-wall geotextile fabric liner encapsulating absorbent, surfaced mounted unit. Locate at each pipe drain.

K. Conductor Heads: Provide conductor heads per SMACNA Figure 1-25, Design 1-25F unless Design Number noted otherwise; 24 gauge Galvanized sheet metal.

L. Gravel Stops: Fabricate of 24 gauge galvanized steel. Form true-to-line and detail as indicated. Provide formed corners locked and soldered full, with flashing flanges at least 4 inches under overlapping roofing materials and with aprons formed to straight lines. Install gravel stops in full bed of plastic cement and nail at 6 inch centers. All joints in gravel stops shall be butt type with back-up plates 12 inches long, of same gauge and profile as the gravel stop. Wipe all exposed surfaces clean. Protect adjacent, exposed surfaces from plastic cement smears and stains.

M. Counterflashings for roof hatches and skylights: 24 gauge sheet metal flashing, removable, per NRCA BUR/MB-14.

N. Roof Pipe Penetrations Flashings: Provide pre-manufactured flashings and counterflashings for pipe penetrations for electrical conduits, mechanical and plumbing lines. Flashing: galvanized steel., with 6" flange. Field seal top of cast-iron counterflashing with silicone sealant per Section 07 92 00, secure to pipe with set screw.
1. Model 1100-4 Series by Elmdor/Stoneman, City of Industry, CA: For single pipe penetrations and 1100-5 Series for vents.
2. Model 910 Future Flash and 915 Multi-Flash Adaptors by Elmdor/Stoneman, City of Industry, CA: Multiple-pipe penetrations, within single pre-manufactured flashing unit: Counterflashing: PVC cap, adapter base and compression nut. Compression rings and gasket. Install per manufacturer's instructions.

O. Window drips at heads of all doors and windows in exterior walls where no roof or overhead protection occurs :
1. At non-recessed or flush conditions: Provide drips of aluminum metal, extend drips 2-inches beyond jambs. Product: Superior Metal Trim SWD Superior Window Drip for 7/8" thick plaster, 2" leg, No. SWD 078-200A, or equal.
2. At recessed or soffit conditions: Provide drips of aluminum, alloy 6063 T5, clear anodized. Product: Fry Reglet Drip Screed, non-vented, No. DS-875-875 or equal.

P. Equipment Roof Curbs and Flashing: Fabricate equipment roof curbs with 20 gauge galvanized steel, not less than 8" high, with 6" flanges, full welded construction. Provide curb flashings and counterflashings, 24 gauge galvanized sheet metal fully soldered and mitered corners. Lengths, sizes, quantities, and location to completely flash roof equipment curbs. 2

Q. Roof Penetrations: Equipment support stand penetrations; 8" high Flashing Collar flanged 6", overlapped 4" by Rain Collar, 24 gauge components, secured with stainless steel drawband sealed top with polyurethane sealant. Stripping and roofing cement products per Roofing Section. Pitch pockets not permitted.

R. Miscellaneous: Provide miscellaneous flashings as indicated in drawings and required to complete entire project, except for items provided under other Sections. Submit shop drawings showing details for approval and use minimum of 24 gauge galvanized steel.
1. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

S. Galvanized sheet metal plaster reveals: 24 gauge sheet metal reveal moldings as detailed and as specified herein. Form molding flanges with screed to slope and drain moisture away from plaster. 2

T. Sill Pans and Window Flashings: Window, door and storefront sill/jamb pans per SMACNA, ASTM E2112 or manufacturer's recommendations. Sill pans: Fabricate from 24 galvanized sheet metal fully soldered seams , minimum 4" high returns at window openings, 1/2" turnup at back.

3.04 FINISH

A. Paint exposed metal flashings with High Performance paints in accordance with Section 09 90 00, for Special Coatings. Colors to be selected by Architect.
   1. Parapet Coping to match metal panel color where adjacent.
   2. Parapet Coping to match curtain wall color (clear anodized) where adjacent.
   3. Parapet Coping to match plaster color where adjacent.

END OF SECTION

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Expansion joint cover assemblies for roofs, walls, ceilings and floor surfaces.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM - American Society for Testing and Materials
   1. ASTM E119 - Methods for Fire Tests of Building Construction and Materials.
   2. ASTM E1399 - Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.

C. ADA - Americans with Disabilities Act of 1990, as amended.
   1. ADA Standards - ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

D. 2019 California Referenced Standard Code (CCR Title 24, Part 12), Chapter 12-7-1 Fire Resistive Standards.

1.03 SUBMITTALS

A. Product Data: Provide joint assembly profiles, dimensions, locations in Work, affected adjacent construction, anchorage devices, available colors and finish and locations of splices.

B. Shop Drawings: Provide the following for each joint system specified:
   1. Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, blockout requirement, entire route of each joint system, and attachments to other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
   2. Detailing of anchorage devices.

C. Three samples illustrating profile, dimension, color and finish and flexible seal selected.

D. Manufacturer's Installation Instructions, Indicate rough-in sizes. Provide templates for cast-in or placed frames or anchors and indicate tolerances for item placement.

E. UL or California State Fire Marshal approval numbers on assemblies submitted.

F. Certification that products meet ASTM E119 fire classification tests and ASTM E1399 joint movement capability.

1.04 FIELD MEASUREMENTS

A. Verify that field measurements are as instructed by manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
1. C/S Group, Conspec Systems, Muncy, PA.
2. MM System Corp., Pendergrass, GA.
3. Watson-Bowman-Acme Corp., Amherst, NY.
4. JointMaster/InPro Corporation, Muskego, WI.
5. Thermal Structures Inc., Corona, CA.
6. Balco Inc.
7. Emseal Joint Systems, Westborough, MA.

B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.02 MATERIALS

A. Refer to drawings for type of assemblies required in specific locations.

B. Types:
1. Series ASM-200, aluminum exterior wall joint covers, extruded aluminum with "Duroflex" gasket (polyethylene vapor barrier).
2. Emseal Seismic Colorseal expansion joint. Colors as selected by Architect.
3. Refer to drawings for widths.

2.03 FABRICATION

A. Back paint components in contact with cementitious materials.

B. Galvanize embedded ferrous metal anchors and fastening devices.

C. Shop assemble components and package with anchors and fittings.

D. Provide joint components in single length wherever practical. Minimize site splicing.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify that joint preparation and affected dimensions are acceptable.

3.02 PREPARATION

A. Provide anchoring devices for installation and embedment.

B. Provide templates and rough-in measurements.

3.03 FABRICATION

A. Furnish units in longest practicable lengths.

B. Provide hairline joints, miter corners.

C. Provide closure materials, transition pieces, T-joints, corner, curbs, cross-connections and accessories required to provide continuous joint cover assemblies. Provide a silicone bead at all transitions in addition to items listed above to provide a water tight connection between all joints.

3.04 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor components to substrate to prevent misalignment. 2

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following tests on areas as selected by Architect.
   1. Water-Spray Test (Field Check): Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
      a. Perform tests on 5% (rounded up to nearest whole number) of expansion joint assemblies in areas as directed by Architect.
      b. Perform tests in each test area as directed by Architect. Perform tests, prior to 50, and 90 percent completion.

C. Expansion joint assemblies will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.06 PROTECTION OF FINISHED WORK

A. Do not permit traffic over unprotected floor joint surfaces.

B. Provide removable strippable coating or reinforced cloth tape protect finish surface.

END OF SECTION

SECTION 08 12 13

HOLLOW METAL FRAMES - WELDED

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Non-rated and Fire-rated Welded steel frames for doors ,transoms , and borrowed lights.

B. Related Sections
1. Section 06 20 00, Finish Carpentry - Installation of Doors.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. SDI - Steel Door Institute.
1. SDI 100 - Recommended Specifications for Standard Steel Doors and Frames, Latest Edition.
2. SDI 111 - Recommended Standard Details Steel Doors and Frames.
3. SDI 117 - Manufacturing Tolerances Standard Steel Doors and Frames.
4. SDI 118 - Basic Fire Door Requirements.
5. SDI 134 - Glossary of Terms for Hollow Metal Doors and Frames.

C. ANSI - American National Standards Institute
1. ANSI A250.4 and A450.5 - Test Procedure / Acceptance Criteria for Physical Conformance.
2. ANSI A250.6- Hardware on Steel Doors (Reinforcement Applications).
3. ANSI A250.8/SDI-100 - Recommended Specifications for Standard Steel Doors and Frames, Latest Edition.
4. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Steel Surfaces for Steel Doors and Frames.
5. ANSI A250.11/SDI-105 - Recommended Erection Instructions for Steel Frames.

D. ASTM - American Society for Testing and Materials
1. ASTM A653 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc - Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A924 – General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
3. ASTM A1008 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
4. ASTM D6386 – Preparation of Hot-Dipped Galvanized Coated Iron and Steel and Hardware Surfaces for Painting.

E. ADA - Americans with Disabilities Act of 1990, as amended.

1. ADA Standards – ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

F. CBC - 2019 California Building Code.

G. CRSC - California Referenced Standards Code (CCR Title 24, Part 12)
1. CRSC-7A.2 - Standard 12-7A-2, Exterior Windows
2. CRSC-7A.4 - Standard 12-7A-4 Fire Resistive Standards, Fire Door Assemble Tests
3. CRSC-10.2 - Standard 12-10-2 Single Point Latching or Locking Devices
4. CRSC-10.3 - Standard 12-10-3 Emergency Exit and Panic Hardware

H. NFPA - National Fire Protection Association
1. NFPA 80 - Fire Doors and Windows

I. UL - Underwriters Laboratories, Inc.
1. UL-10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Fire Tests of Door Assemblies

J. Standard 12-7-4 Fire Resistive Standards, Fire Door Test Assembly Tests - California Referenced Standards Code, CCR Title 24, Part 12.

K. AWS - American Welding Society
1. AWS A2.4 - Standard Symbols for Welding, Brazing and Non Destructive Examination
2. AWS A5.1 - Carbon Steel Electrodes for Shielded Metal Arc-Welding
3. AWS A5.5 - Low Alloy Steel Electrodes for Shielded Metal Arc-Welding
4. AWS B2.1 - Welding Procedure and Performance Qualification
5. AWS D1.1 - Structural Welding Code, Steel
6. AWS D1.3 - Structural Welding Code, Sheet Steel

1.03 SUBMITTALS

A. Shop drawings indicating frame configuration, anchor types and spacing, location of cutouts for hardware, reinforcement and finish.

B. Product data.

C. Manufacturer's installation instructions.

D. Job Closeout: provide one complete manufacturer's catalog to Owner's lock shop or Authorized Representative.

1.04 QUALITY ASSURANCE

A. Manufacture frames to conform to SDI standards except where exceeded by this Specification.

B. Comply with ANSI/SDI A250.4 Level A, one million cycle swing test performance for 3070 door frames.

C. Manufacturer: Company specializing in manufacturing products specified in this Section having minimum five (5) years experience.

D. Installer: Firm with minimum five (5) years experience in installation of metal doors and frames.

1.05 DELIVERY, STORAGE AND PROTECTION

A. Deliver and protect frames with manufacturer's shipping safeguards.

B. Attach spreader bars on welded frames to preclude warping or bending during delivery and storage.

C. Storage: Store in dry secure location. Place units on minimum 4 inch high wood blocking. Avoid non-vented plastic or canvas shelters. Provide 1/4 inch wide spaces between stacked units.

1.06 WARRANTY

A. One-year warranty against defects in materials and workmanship. Warranty to commence at Date of Certified Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
1. Ceco Door, Milan, TN.
2. Curries Company, Mason City, IA.
3. Door Components, Inc., Fontana, CA.
4. Mesker Doors, Huntsville, AL.
5. Republic Doors and Frames, McKenzie, TN.
6. SteelCraft, an Allegion Brand, Dublin, Ireland.

B. Or equal in accordance with Division 01, General Requirements for Substitutions.

2.02 WELDED FRAMES 2

A. Type: ANSI A250.8/SDI-100 - Interior frames shall be Level 1, Standard Duty frames, minimum 18-gauge and exterior frames shall be Level 2, Heavy Duty frames, minimum 16-gauge, with integral stop and flat trim, double rabbet, profiles as indicated on Drawings, cold rolled steel, Commercial Steel, ASTM A1008, paintable galvannealed steel ASTM A653 and ASTM A924 for exterior applications.

B. Anchors: Provide two anchors at head for openings up to 48 inches, three if wider, maximum 30 inches on centers. Provide three at jamb for doors up to 84 inches in height, additional anchors at maximum 30 inches on centers for higher doors.
1. Provide appropriate type of anchors consistent with type of wall construction for each installation and in conformance with SDI 111 and ANSI 250.11.

C. Floor Attachment: Provide adjustable base anchor with extension for expansion anchor attachment to concrete floor. Extension factory welded. Minimum thickness: 14 gauge.
   1. Wedge Type: KWIK Bolt TZ, 3/8 to 3/4 inch diameter, ICC ESR-1917, by Hilti Inc., Tulsa, OK.
   2. Monolithic Concrete Slabs: Clip-type anchors, with holes to receive fasteners.

D. Hardware Attachment: Mortise, reinforce, drill and tap at factory to receive specified hardware. Install minimum 10 gauge reinforcing welded to frame for surface mounted hardware, except install 7 gauge reinforcing for hinges. Tap to templates.
   1. Install reinforcing for closers, both sides of frames, on all frames, single and pairs, labeled and non-labeled.
   2. Use 10 Gauge reinforcing for locks, panics, closers, and hold-open arms.

E. Silencers: Make provision for minimum three rubber silencers at strike jamb of all doors except fire-rated doors, and one at head of each leaf of double doors, except fire-rated doors.

F. Fire-Rated Frames:
   1. Construct as tested and rated in accordance with SDI 118.
   2. Conform to Standard 12-7-4 Fire Resistive Standards, Fire Door Test Assembly Tests - California Referenced Standards Code, CCR Title 24, Part 12 and NFPA 80.
   3. Attach UL or WH label to frame.
   4. Solid grout frames abutting against masonry and concrete walls.
   5. Refer to drawings for rating requirements.

2.03 PROTECTIVE COATINGS

2

A. Interior Frames:
   1. Metallic coating protection not required.
   2. Pretreat and shop prime, air-dried, conforming to ANSI A250.10.
   3. Finish paint frames under Section 09 90 00 Painting, colors per Finish Schedule on Drawings.

B. Exterior Frames:
   1. Metallic coating protection required: ASTM A653, hot-dipped galvanized, zinc-coated iron alloy A60 paintable galvannealed coating.
   2. Pretreat and shop prime, air-dried, conforming to ANSI A250.10.
   3. Finish paint frames under Section 09 90 00, colors per Finish Schedule on Drawings.
   4. Wipe coat galvanized steel is not permitted.

C. On surfaces where metallic coating has been damaged or removed during fabrication, frames shall be touched-up with factory-applied primer.

2.04 FABRICATION

A. Fabricate exterior welded steel door frames machine-mitered and full welded (Continuously Welded) unit type. Weld and grind smooth. No intermittent welds or plate splices permitted at intersections.

B. Fabricate interior welded steel door, borrowed lights , and transom frames as machine-mitered face-welded unit type. Weld and grind smooth.
   1. Where cross mullions or T intersections occur, frames shall be fabricated as butted and face-welded assembly joints. At mullion-to-base intersections extend mullion to floor and face weld. Where butted joints are exposed to weather, seal intersection as specified in Section 07 92 00.

C. At borrowed lights , transom frames apply minimum 5/8-inch-high, 16 gauge channel stops. Attach with flat head machine screws, countersunk, tamper-proof type on outside of exterior frames.
   1. Channel stops to be located on outside of exterior frames and on secure side of interior frames.

D. Machine mitered faces and butt-joined integral stops permitted with continuous welds.

E. Fabricate frames with hardware reinforcement plates welded in place.

F. Fabricate frames to accept anchors as described in SDI-111 for type of wall construction.

G. Reinforce frames for door closers on both sides of frames.

H. Apply primer to all surfaces of frames, in accordance with requirements of ANSI A250.10. Metallic-coated protected surfaces shall be pretreated prior to application of primer.

I. Attach fire-rated label to each fire-rated door frame.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install frames in accordance with ANSI A250.11/SDI-105.
   1. Installation of jamb anchors to steel framing: Per SDI-105.
   2. Install Floor anchors, 1 clip angle per jamb with expansion wedge type anchor.
   3. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

B. Fire doors frames shall be installed in accordance with their listing, Standard 12-7-4 Fire Resistive Standards, Fire Door Assembly Tests California Referenced Standards Code, CCR Title 24, Part 12, and NFPA No. 80, and the manufacturer's instructions.

C. Install insulation behind frames, unless noted otherwise.

D. Coordinate anchor placement with type of wall construction.

E. Paint frames under Section 09 90 00, Painting.

3.02 TOLERANCES

A. Conform to standard of tolerances as required in SDI-117.

END OF SECTION

SECTION 08 13 13

HOLLOW METAL DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fire-rated rolled-steel doors.

B. Related Sections:
1. Section 06 20 00, Finish Carpentry - Installation of Doors.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ADA - Americans with Disabilities Act of 1990, as amended.
1. ADA Standards - ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

C. SDI - Steel Door Institute.
1. SDI 100 - Recommended Specifications for Standard Steel Doors and Frames, Latest Edition.
2. SDI 118 - Basic Fire Door Requirements.
3. SDI 111 - Standard Details Steel Doors and Frames .
4. SDI 117 - Manufacturing Tolerances Standard Steel Doors and Frames.

D. ANSI - American National Standards Institute
1. ANSI A250.4 - Test Procedures and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
2. ANSI A250.5 - Accelerated Physical Endurance Test Procedure for Steel Doors, Frames, and Frame Anchors.
3. ANSI A250.8/SDI 100 - Recommended Specifications for Standard Steel Doors and Frames.
4. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI A250.11/105 - Recommended Erection Instructions for Steel Frames.

E. ASTM - American Society for Testing and Materials
1. ASTM A653 - Standard Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
3. ASTM A1008 - Standard Specifications for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

4. ASTM A568 - General Requirements for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.

F. CBC - 2019 California Building Code
1. CBC-10 - CBC Chapter 10, Means of Egress
2. CBC-11 - CBC Chapter 11B, Accessibility to Public Buildings, Public Accommodations, Commercial Facilities and Publicly Funded Housing

G. CRSC - California Referenced Standards Code (CCR Title 24, Part 12)
1. CRSC-7A.4 - Standard 12-7-4 Fire Resistive Standards, Fire Door Assemble Tests
2. CRSC-10.2 - Standard 12-10-2 Single Point Latching or Locking Devices
3. CRSC-10.3 - Standard 12-10-3 Emergency Exit and Panic Hardware

H. NFPA - National Fire Protection Association
1. NFPA 80 - Fire Doors and Windows
2. NFPA 105 - Installation of Smoke Door Assemblies
3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies

I. UL - Underwriters Laboratories, Inc.
1. UL 10C - Positive Pressure Fire Tests of Door Assemblies
2. UL 1784 - Air Leakage Test for Door Assemblies

J. ITS-WH - Intertek Testing Services-Warnock-Hersey.

1.03 SUBMITTALS

A. Shop drawings indicating core material, location of cutouts for hardware, reinforcement and finish.

B. Product data.

C. Manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

A. Manufacture doors to conform to SDI standards except where exceeded by this Specification.

B. Comply with ANSI/SDI A250.4 Test Procedure and Acceptance Criteria for - Physical Endurance for Steel Doors and Hardware Reinforcings. Level A, one million cycle swing test performance.

C. ADA-The Americans with Disabilities Act - Title II-Uniform Federal Accessibility Standards.

1.05 DELIVERY, STORAGE AND PROTECTION

A. Deliver and protect doors with manufacturer's shipping safeguards.

B. Storage: Store in dry secure location. Place units on minimum 4-inch high wood blocking. Avoid non-vented plastic or canvas shelters. Provide 1/4-inch wide spaces between stacked doors.

1.06 WARRANTY

A. One-year warranty against defects in materials and workmanship. Warranty to commence at Date of Certified Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form the basis for design and quality intended.
1. Ceco Door, Milan, TN.
2. Curries Company, Mason City, IA.
3. Door Components, Inc., Fontana, CA.
4. Mesker Doors, Huntsville, AL.
5. Republic Doors and Frames, McKenzie, TN.
6. SteelCraft, an Allegion Brand, Dublin, Ireland.

B. Or equal in accordance with Division 01, General Requirements for Substitutions.

2.02 DOORS

A. Exterior Doors: ANSI A250.8/SDI-100, Level 3, Extra Heavy-Duty and Physical Performance Level A, 1-3/4-inches thick, Model 2 Seamless, 16-gauge cold-rolled face sheets, ASTM A653, seamless, continuously welded seam dressed smooth, hollow-steel construction, sizes as scheduled on drawings. Close top and bottom with flush end closures, seal and make top closures watertight. Beveled edge profile.

B. Interior Doors: ANSI A250.8/SDI-100, Level 2, Heavy-Duty, Physical Performance Level B, 1-3/4-inches thick, Model 2 Seamless, 18-gauge cold-rolled face sheets, ASTM A1008, seamless continuously welded seam dressed smooth, hollow-steel construction, Close top and bottom with flush end closure, beveled edge profile, sizes as scheduled on drawings, prime coated only.

C. End Closures: Minimum 18 gauge.

D. Fire Rated Doors Assembly: Test in accordance with NFPA 252. CRSC California Referenced Standards Code, Standard 12-7-4, Fire Door Assembly Tests.

E. Fire Rated Doors: Label "S" for smoke assembly requirements, NFPA 80, NFPA 105.

2.03 DOOR CORE

2

A. Performance Test Procedures Requirements: Conform to ANSI A250.4

B. Core for Fire-Rated Doors: mineral core 16-20 lb. density (incombustible). Conform to Door Schedule for fire rating required.

C. Frames for Fire-Rated Doors: Conform to CRSC California Referenced Standards Code, Standard 12-7-4, fire door tests, Label "S" for smoke assembly requirements NFPA 105 and Section 08 12 13.

2.04 PROTECTIVE COATINGS

A. Interior Doors:
1. Metallic-coating protection not required.
2. Pre-treat and shop prime with modified alkyd, air-dried, conforming to ANSI A250.10.

B. Exterior Doors:
1. Metallic coating protection required, types permitted: ASTM A653, hot-dip galvanized, zinc-iron alloy A60 paintable galvannealed coating.
2. Pre-treat and shop prime with modified alkyd, air-dried, conforming to ANSI A250.10.
3. Finish paint doors under Section 09 90 00, Painting, colors per Finish Schedule on Drawings.

2

C. On surfaces where zinc has been damaged or removed during fabrication, doors shall be touched-up with factory-applied primer.

2.05 FABRICATION

A. Fabricate doors from cold-rolled steel conforming to ASTM A1008/A1008M or ASTM A924. Stretcher-leveled standard of flatness for face sheets.

B. Manufacturing tolerances per SDI 117 - Manufacturing Tolerances Standard Steel Doors and Frames.

C. Fabricate doors with cutouts sized for hardware and openings as indicated. Non-handed doors using hinge fillers are not permitted.

D. Reinforce, drill and tap doors to receive mortise hinges, locks, latches, flush bolts and closer. Use reinforcing gauges as listed in Table 4 of ANSI A250.8/SDI-100. Channel or plate reinforcing only.

E. Locate hardware according to Table 5, ANSI A250.8/SDI-100, CBC 11B-404.2.7.

F. Apply primer to all surfaces of doors in accordance with requirements of ANSI A250.10. Metallic-coated surfaces shall be pre-treated prior to application of primer.

G. Attach fire-rated label to hinge-stile of each fire-rated door unit and frames.

H. Hardware Enclosures: Provide enclosures and junction boxes within doors for electrically operated door hardware, interconnected with UL-approved, 1/2-inch-diameter conduit and connectors. Where indicated for installation of wiring, provide access plates to junction boxes, fabricated from same material and thickness as face sheet and fastened with at least 4 security fasteners spaced not more than 6 inches on centers.

PART 3 - EXECUTION

3.01 INSTALLATION OF HOLLOW METAL DOORS

A. Install doors in accordance with SDI ANSI A250.11/105 and SDI 122 recommendations.

B. Install doors under Section 06 20 00 Finish Carpentry - Installation of Doors.

C. Coordinate installation of glass or louvers where indicated.

3.02 ADJUSTING AND CLEANING

A. Adjust for smooth and balanced door movement.

B. Paint doors under Section 09 90 00, colors per Finish Schedule on Drawings.

END OF SECTION

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wood doors, fire-rated and non-rated.

B. Glass stops.

C. Related Sections:
1. Section 01 35 42, CALGreen Requirements.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ANSI A208.1 - American National Standard -Particleboard.

C. WDMA I.S.1A - (Latest Edition) - Window and Door Manufacturers Association.

D. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.

E. Chapter 7 and 10, 2019 California Building Code.

F. ADA - Americans with Disabilities Act of 1990, as amended.
1. ADA Standards ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

G. WI - Manual of Millwork, Architectural Woodwork Standards (AWS), Latest Edition.

H. CBC - 2019 California Building Code
1. CBC-10 - CBC Chapter 10, Means of Egress
2. CBC-11 - CBC Chapter 11B, Accessibility to Public Buildings, Public Accommodations, Commercial Facilities and Publicly Funded Housing

I. California Green Building Standards Code, CALGreen - 2019.

J. CRSC - California Referenced Standards Code (CCR Title 24, Part 12)
1. CRSC-7A.4 - Standard 12-7A-4 Fire Resistive Standards, Fire Door Assemble Tests
2. CRSC-10.2 - Standard 12-10-2 Single Point Latching or Locking Devices
3. CRSC-10.3 - Standard 12-10-3 Emergency Exit and Panic Hardware

K. NFPA - National Fire Protection Association
1. NFPA 80 - Fire Doors and Windows

2. NFPA 105 - Installation of Smoke Door Assemblies
3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies

L. UL - Underwriters Laboratories, Inc.
1. UL-10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Fire Tests of Door Assemblies

M. WH - Warnock-Hersey Laboratory

N. ITS-WH - Intertek Testing Services-Warnock-Hersey.

1.03 SUBMITTALS

A. Shop drawings indicating door elevations, types, hand, thickness, stile and rail reinforcement, internal blocking for hardware attachment and cutouts.

B. Product data.

C. CALGreen Submittals:
1. Product Data Sheets and Declaration Statements showing compliance with CALGreen Code per 1.04.I.

D. Three samples for transparent finish doors provide two 36 x 36 inches samples, of each door type specified, illustrating each face veneer specified. Samples shall illustrate core material and finish choice.

E. Manufacturer's installation instructions.

F. Certificate of Compliance for fire-rated doors.

1.04 QUALITY ASSURANCE

A. Conform to Standard 12-7-4 Fire Resistive Standards, Fire Door Assemble Tests - California Referenced Standards Code, CCR Title 24, Part 12 and NFPA 80.

B. Provide doors from one manufacturer only.

C. Doors shall be manufactured in accordance with Section 12 of the Latest edition of the Architectural Woodwork Standards (AWS) of the Woodwork Institute for Premium Grade, Hot Press 5-Ply construction, bonded construction, or to higher standards as specified herein.

D. Before delivery to jobsite, door supplier shall submit WI Certified Compliance Certificate, countersigned by manufacturer, indicating products he will furnish for this job and certifying that they will fully meet requirements of grade or grades specified.

E. First page of shop drawings shall bear WI Certified Compliance Label. Shop drawings not conforming to this requirement will be rejected.

F. One (1) copy of latest issue of WI Architectural Woodworks Standards (AWS) shall be made available for reference at jobsite throughout installation period.

G. Upon completion, WI Certified Compliance Certificate, countersigned by manufacturer, shall be submitted.

H. California Green Building Standards Code, CALGreen - 2019.
   1. Adhesives, sealants, primers, and caulks shall comply with air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, per CALGreen Tables 5.504.4.1 and 5.504.4.2.
   2. Paints and Coatings shall comply with VOC limits in Table 1 of the ARB, per CALGreen Table 5.504.4.3
   3. Composite wood products (plywood, particle board, medium density fiberboard) shall comply with Formaldehyde limits per CALGreen Table 5.504.4.5.

1.05 DELIVERY, STORAGE AND PROTECTION

A. Protect doors with resilient packaging, sealed with heat shrunk plastic or other manufacturer's shipping safeguards.

B. Package, deliver and store doors in accordance with WI requirements.
   1. Store in dry, broom-clean area.
   2. Protect materials from damage.
   3. Replace units damaged, warped or otherwise not usable.

C. Exposed wood at tops, bottoms and cutouts for hardware and accessories: Seal prior to shipment.

1.06 WARRANTY

A. Provide documentation under provisions of Division 01, General Requirements.

B. Provide Life-of-Original-Installation Warranty for solid core interior doors.
   1. Warranty shall state that doors will not warp, twist, bend, shrink, the veneers buckle or delaminate, or the joints open for the warranty period. Any door of 25 square feet or larger may have a warp or twist of not more than 1/4 inch in eight feet. Any door that develops defects within the scope of the warranty shall be replaced with a new door without expense to the Owner.
   2. During the first year of warranty, replacement doors shall be delivered to the Contractor for installation.
   3. During the succeeding years of the warranty, replacement doors shall be delivered to the building in which defective door is located. Bill of lading shall indicate the name of the building and room or location where door is to be replaced. Warranty shall include cost of removal of defective unit, installation of replacement and finishing.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
   1. Marshfield Door Systems Inc., Marshfield, WI.
   2. Eggers Industries, Two Rivers, WI.
   3. VTI Industries, Holstein, IA.
   4. Algoma Architectural Doors, Algoma, WI.
   5. Oshkosh Door Company, Oshkosh, WI.
   6. Haley Bros., Inc., Buena Park, CA.
   7. Graham Wood Doors, Mason City, IA.
   8. ABS Manufacturing, Stockton, CA.
   9. Western Oregon Door, Winston, OR.

B. Or equal as approved in accordance with Division 01, General Requirements for Substitutions.

2.02 DOOR CONSTRUCTION TYPES

A. Particle Board Core PC-5 (Non-Fire-Rated)
   1. Thickness: 1-3/4 inch.
   2. Face:
      a. Transparent Finish:
         1) Grade: Premium, Grade "AA" faces .
         2) Face: wood veneer, species; Select Select White Maple hardwood veneer, sapwood.
         3) Cut: plain sliced.
         4) Matching: balance slip match for leaf matching.
         5) Pair Match: Balance Match for doors in pairs.
         6) Set Match: Balance Match for doors in sets.
   3. Crossband: Hardwood veneer or engineered high-density fiberboard, 1/16 inch thick.
   4. Stiles: Stiles same species at transparent finish.
   5. Top and Bottom rails: 1-1/8 inch hardwood or softwood mill option, bonded to core.
   6. Face Assembly Adhesive: Type I, waterproof.
   7. Core Assembly Adhesive: Type II, water-resistant.
   8. Core: Particleboard, 28 lb. low density, ANSI A208.1, Table A, Grade LD-2.
   9. Moisture Stripping: Sealed edges.
   10. Acoustical rating: 31 STC
   11. Blocking for Hardware: Flame resistant, 6 inch top edge for closers, 5.5 inches for bottom hardware or automatic closers where applicable, 5 x 18 inch lock blocks, 5.5 inch cross blocking for panic hardware, 5 x 12 inch for floor closers or pivot hinges where applicable.
   12. Performance Rating: Extra Heavy Duty.

B. Particle Board Core - PC-5 20PP (20 minute fire rated, Positive Pressure), S-Label, smoke and draft rated.
   1. Thickness: 1-3/4 inch.

2. Face:
   a. Transparent Finish:
      1) Grade: Premium, Grade "AA" faces .
      2) Face: wood veneer, species; Select Select White Maple hardwood veneer, sapwood.
      3) Cut: plain sliced.
      4) Matching: balance slip match for leaf matching.
      5) Pair Match: Balance Match for doors in pairs.
      6) Set Match: Balance Match for doors in sets.
3. Crossband: Hardwood veneer or engineered high density fiberboard, 1/16 inch thick.
4. Stiles: Stiles same species at transparent finish. Factory install concealed intumescent seals per UL 10C, Category A.
5. Top and Bottom Rails: 1-1/8 inch hardwood or softwood mill option, bonded to core. Install intumescent seals per UL 10C at top rail.
6. Face Assembly Adhesive: Type I, waterproof.
7. Core Assembly Adhesive: Type II, water-resistant.
8. Core: Particleboard, 28 lb. low density, ANSI A208.1, Table A Grade LD-2
9. Moisture Stripping: Not applicable.
10. Acoustical rating: 29 STC
11. Blocking for Hardware: Flame resistant, 6 inch top edge for closers, 5.5 inches for bottom hardware or automatic closers where applicable, 5 x 18 inch for lock blocks, 5.5 inches cross blocking for panic hardware, 5 x 12 inch for floor closers or pivot hinges where applicable.
12. Performance Rating: Extra Heavy Duty.

C. Pair of doors in exits: Minimum width of doors, 32 inches, to allow a clear unobstructed opening of 32 inches in width when door is positioned at an angle of 90 degrees from its closed position.

2.03 ACCESSORIES

A. Glass Stop: Unit frame, Model FGS 75 manufactured by Anemostat Products Division, Carson, CA, or equal as approved in accordance with Division 01, General Requirements for Substitutions, for fire-rated and non-fire-rated doors.
   1. Frame: 18 gauge.
   2. Finish: Beige baked enamel primer, paint per Section 09 90 00, color as selected by Architect.
   3. Glass: Refer to Section 08 80 00.
   4. Mounting: Countersink, one-way vandal resistant heads, through bolts.

B. Ratings: For doors specified.

2

2.04 FABRICATION

A. Fabricate non-rated doors in accordance with WI Quality Standards and WDMA I.S.1-A.

B. Fabricate fire-rated doors in accordance with WI Quality Standards and WDMA I.S.1-A-Latest Edition and to UL or WH requirements. Attach permanent metal fire-rating label to door edge, either on hinge stile or top edge.

C. Intumescent Seals: Fabricate fire-rated doors with intumescent seals in accordance with UL 10C, Category A, for positive pressure compliance. Furnish flush with door edge type intumescent seals, exposed at top rail and veneer-covered at stiles. Frame Surface-applied adhesive seals, Category B, not permitted.

D. Pre-machine doors at factory for finish hardware. Cutouts for hardware in doors having a fire rating of 20 minutes or more shall be accomplished at the factory before labels are affixed. Preparation shall be performed in accordance with manufacturer's inspection service procedure and under label service.

E. Medium density overlay shall be readily sandable. Hardboard surface material not permitted.

F. Only five-ply hot-press construction is permitted.

G. Veneer: Face veneer grain shall run vertically; crossband veneer run horizontally.

H. Transom Panels: Same construction as doors. For transparent finish: continuous match.

2.05 FACTORY FINISH

A. Factory Finish: Premium finish, meet or exceed performance standards of WI System 4 Conversion Varnish, clear and opaque. Factory-finished doors shall be installed just prior to Substantial Completion.
   1. Stained and sealed finish: Refer to Finish Schedule on Drawings and as selected by Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Section 06 20 00.

3.02 INSTALLATION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge corner to corner, or as required to meet door warranty.

B. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08 41 13

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aluminum doors, frames, glazing components and glazed lights.

B. Shadow Boxes.

C. Anchors, brackets and attachments.

D. Door hardware.

E. Perimeter sealant.

F. Partition Closures.

G. Related Sections:
1. Section 08 71 00, Door Hardware.
2. Section 08 71 05, Acoustical Door Gaskets.
3. Section 08 80 00, Glazing.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM - American Society for Testing and Materials
1. ASTM A36 - Structural Steel.
2. ASTM A123 - Zinc (Hot-Dip Galvanized) coatings on Iron and Steel Products.
3. ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape and Tube.
4. ASTM E90 - Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
5. ASTM E283 - Rate of Air Leakage through External Windows, Curtain Walls and Doors.
6. ASTM E330 - Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
7. ASTM E331 - Water Penetration of Exterior Windows, Curtain Walls and Doors.
8. ASTM E1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation.
9. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
10. ASTM E1425 - Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylights, and Glazed Wall Systems.

C. AAMA - American Architectural Manufactures Association: AAMA 501 - Methods of Test for Exterior Walls. (Mfg's mock up tested in lab).

D. Test per AAMA 503-12 Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.

E. AAMA TIR-A11-04 - Maximum Allowable deflection of Framing Systems for Building Cladding Components at Design Wind Loads.

F. AAMA 1801 - Voluntary Specification for the Acoustical Rating of Exterior Windows, Doors, Skylights, and Glazed Window Sections.

G. ADA - Americans with Disabilities Act of 1990, as amended.
   1. ADA Standards - ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

H. CBC - 2019 California Building Code.

I. DSA - The Division of the State Architect.

J. ICC - International Code Council.

K. CPSC 16 CFR 1201- U.S. Consumer Products Safety Commission, Safety Standard for Architectural Glazing Material, Consumer Protection Safety Commission, Code of Federal Regulations. All glazing shall be tested in accordance with CPSC 16 CFR 1201. Glazing shall comply with the test criteria for Category II as indicated in Table 2406.2(1), 2019 CBC.

1.03 SYSTEM DESCRIPTION

A. Performance Requirements
   1. System to provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F without causing detrimental effects to system or components.
   2. Design and size members to withstand dead loads and live loads caused by pressure and suction of wind as calculated in accordance with requirements of Chapter 24, and Chapter 16A Section 1609A of CBC and ASCE 7 Chapter 6.
   3. Uniform Load: A static air design load of 20 psf shall be applied in the positive and negative direction in accordance with ASTM E330. No deflection in excess of L/175 of the span of any framing member up to 13'-6" and L/240 13'-6" plus 1/4" and above. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
   4. Limit water infiltration to zero at 12 pounds-force per square foot, ASTM E331.
   5. Air Infiltration: ASTM E283; maximum .06 cfm per square foot of fixed area when tested at 6.24 pounds per square foot (50 wind speed) static air pressure difference

6. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.
7. When a pair of doors is used, one of the doors to provide clear, unobstructed opening 32 inches in width with the door positioned at an angle 90 degrees from its closed position.
8. Noise Reduction: Test according to ASTM E90, with ratings determined by ASTM E1332.:

1.04 SUBMITTALS

A. Shop Drawings: including system and component dimensions; components with in assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.

B. Product data

C. Manufacturer's installation instructions.

D. Samples: Three samples, illustrating pre-finished aluminum surface and specified glass.

E. Deferred Approval
1. Installation of Aluminum Storefronts and Entrances shall not be started until detailed plans and specifications are approved by Division of the State Architect, (DSA).
2. DSA Approval: Manufacturer shall furnish Architect complete shop drawings and calculations as specified above, certified and stamped by Structural Engineer currently licensed in California. Manufacturer shall employ and pay Engineer for Certification of Drawings and Calculations.
    a. Architect will submit drawings and calculations to DSA for approval before fabrication.
    b. Show details of Aluminum Storefront fasteners and anchorage to structural members at head and jambs. Size of anchors and embedment lengths, use 80 percent of ICC Reports capacities for anchors. Key details to elevation section.
    c. Headers and king studs connections to structural beams and columns. Provide details keyed to elevations section.
    d. Provide calculations for worst case D+L+Seismic or wind loads, justify connections. Consider areas of discontinuity as required by CBC.
    e. Calculations required: analyze and design jamb and head elements (king studs, header beams).
    f. The aluminum mullions and cross pieces shall be designed by a Registered Engineer (with calculations) show sectional properties. Show connections between storefront and various elements.
3. Refer to Division 01, General Requirements for Deferred Approvals.

1.05 DELIVERY, STORAGE AND HANDLING

A. Provide wrapping or strippable coating to protect pre-finished aluminum surfaces.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to product manufacturer.
   2. Manufacturer Qualifications: Manufacturer capable of providing structural calculations, applicable independent product test reports, installation instructions, a review of the application method, customer approval and periodic field service representation during construction.
   3. On access control installations, all wiring to be coordinated with a licensed electrical installer.

B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.07 MOCKUPS

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical wall area as shown on Drawings.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.09 WARRANTY

A. Provide under Provisions of Division 01 General Requirements.

B. Warranty: Include coverage for complete System installation for failure to meet specified requirements.
   1. Failures include, but are not limited to the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Air and Water leakage through fixed glazing and framing areas.
      d. Failure of operating components to function properly.

C. Special Finish Warranty: Contractor agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: 10 years

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
   1. Arcadia Inc., Vernon, CA.
   2. Kawneer Company, Inc., Visalia, CA.
   3. EFCO Corporation, Monett, MO.
   4. Oldcastle Glass/Vistawall Architectural Products, Terrell, TX.
   5. Wausau Window and Wall Systems, Wausau, WI.
   6. Graham Architectural Products

B. Or equal as approved in accordance with Division 01 General Requirements for Substitutions.

2.02 MATERIALS

A. Extruded Aluminum: ASTM B221; 6063-T6 alloy and temper.

B. Glazing Gaskets:
   1. EPDM elastomeric extrusions

C. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, non-migrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements

D. Steel Reinforcement Sections: ASTM, A36; shapes to suit mullion sections, ASTM A611 for cold-rolled sheets.

E. Touch-Up Primer for Galvanized Surfaces: Zinc-rich Type.

F. Fasteners: Stainless steel.

G. Sealant: per Section 07 92 00 Joint Sealers.

2.03 FABRICATED COMPONENTS

A. Frames: 2-1/4" x 6", profile with offset glazed. Minimum wall thickness of 0.08 inches. Framing Section Properties in confirmance with Wind Load and height requirements.
   1. Model:
      a. SF1: Arcadia TC670 Series: Thermally broken, captured, offset glazed, 1" glazing, 2-1/4" x 6".
      b. Screw Spline System.
      c. Or equal in accordance with Division 01, General Requirements

B. Entrances - Swing doors:
   1. Arcadia WS 512 HD, Heavy Duty
      a. Wide stile, size 2 inches x 5 inches, 5-1/8 inch top rail, offset pivot hinges. 10 inch bottom rail. Square glass stops. Thermally Broken.
      b. For 1" insulating glazing.
      c. Acoustical door gaskets as indicated in Schedule on Drawings.

C. Shadow Boxes: Comply requirements with Section 08 80 00.

D. Partition Closures - Aluminum: Sound Barrier Mullion Trip Cap Systems by Mull-it-Over or approved equal.
   1. Profile: 55 Classic Mullion Trim Cap
   2. Components:
      a. Aluminum Extrusions:
      b. Thickness: 0.125 inches.
      c. Profile: As selected and approved by Architect to allow solid attachment and fastening to the partition wall framing.
   3. Sound Absorbing Foam:
      a. Resistant to smoke, flame, and microbial growth.
      b. Fire Rating: ASTM E 84 Class 1.
      c. Fungi Resistance: Zero rating per ASTM G 21.
   4. Compressible Foam: Between edge of extrusion and interior face of curtain wall glass.
      a. Thickness: Standard 1/2 inch (12.7 mm), 3/4" (19.1 mm), 1 inch (25.4 mm) or 1-1/2" (38.1 mm) as required to accommodate mullion deflection.
      b. Color: Light gray
   5. Fasteners:
      a. Self Tapping or appropriate threaded fastener.
      b. Compatible with all materials fasteners will contact with and not causing galvanic corrosion.
   6. Snap Cover: Snap-on fastener cover.
   7. Acoustical Sound Sealant: Acrylic latex based.
   8. Accessories:
      a. Provide necessary and related parts and tools to complete installation.
   9. Finish: As selected by Architect.

E. Corner Mullions: 90 degree inside and outside corners, refer to drawings.

2.04 GLASS AND GLAZING MATERIALS

A. Tempered glass: All glazing shall be tested in accordance with CPSC 16 CFR 1201, and comply with the test criteria for Category II as indicated in Table 2406.2(1), 2019 CBC.

B. Glass in Exterior Lights and Doors: 1" thick insulating, tempered, tinted Low-E glass for TRIFAB VG 451T Thermal , as specified in Section 08 80 00.

C. Glazing: All units shall be "dry" glazed with EPDM gasket on both exterior and interior.

2.05 HARDWARE - DOORS

A. Applied Stop with weathering: Manufacturer's standard.

B. Sill Sweep Strips: Resilient seal type, Manufacturer's standard.

C. Threshold: Extruded aluminum, one piece per door opening 4 inches wide, 1/2 inch high, Manufacturer's standard.

D. Hinges: Refer to Section 08 71 00, Door Hardware.

E. Cross Rail: 3-1/2 inch high, Manufacturer's standard.

F. Pull Bars (non-panic locations): As specified in Section 08 71 00.

G. Panic Devices: As specified in Section 08 71 00.

H. Closer: As specified in Section 08 71 00.

I. Cylinder Lock: As specified in Section 08 71 00.

J. Weatherstripping:
   1. Meeting stiles on pairs of doors: adjustable astragal utilizing wool pile with polymeric fin.
   2. Single acting door and frame: thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.

K. Provide EPDM or vinyl-blade gasket weather-stripping in bottom of door rail, adjustable for contact with threshold.

2.06 FABRICATION

A. Fabricate doors and frames allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation. Door corner construction shall consist of mechanical clip fastening, Shielded Inert Gas Metal Arc deep penetration plug welds and 1-1/8" long fillet welds inside and outside of all four corners.

B. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline and weatherproof.

C. Develop drainage holes with moisture pattern to exterior.

D. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

E. Prepare components to receive anchor devices. Fabricate anchorage items.

F. Arrange fasteners, attachments and jointing to ensure concealment from view.

G. Prepare components with internal reinforcement for door hardware and door operator hinge hardware.

H. Provide acoustic door gasket where indicated.

2.07 FINISHES

A. Extruded Aluminum Surfaces: Clear Anodized AA-M10C22A41, Class I, 0.7 mil, AAMA 611.

B. Apply two coats of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

2.08 SOURCE QUALITY CONTROL

A. Source Quality: Provide aluminum entrances specified herein from a single source.

B. Fabrication Tolerances: Fabricate aluminum entrances in accordance with entrance manufacturer’s prescribed tolerances.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify wall openings and adjoining air and vapor seal materials are ready to receive Work of this Section.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install doors, frames, glazing and hardware in accordance with manufacturer's instructions. .
   1. Install doors and hardware in accordance with manufacturer’s printed instructions.
   2. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weather-tight construction.

B. Use anchorage devices to securely attach frame assembly to structure.

C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work.

D. Coordinate attachment and seal of air and vapor barrier materials.

E. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

F. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.

G. Install glass and infill panels in accordance with Section 08 80 00, using exterior manufacturer's standard extruded glazing gaskets.

H. Install perimeter two component polyurethane type sealant, backing materials, and installation requirements in accordance with Section 07 92 00. Color shall match adjacent aluminum finish.

I. Adjust operating hardware.

J. Install Partition Closures at voids between glazing system and abutting walls, per manufacturer's recommendations.

3.03 TOLERANCES

A. Variation from Plane: 0.03 inches per foot maximum or 0.25 inches per 30 feet, whichever is less.

B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following tests on representative areas of aluminum-framed entrances and storefronts.
   1. Test per AAMA 503-12 and ASTM E1105 Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems. During construction prior to issuance of the building occupancy permit, but no later than six months after issuance of the occupancy permit.
      a. Air Infiltration Tests: Conduct tests in accordance with AAMA 503 and ASTM E783. Allowable air infiltration (air leakage) shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft2, whichever is greater.
      b. Water Infiltration Tests: Conduct tests in accordance with AAMA 503 and ASTM E1105. No uncontrolled water leakage is permitted when tested at a static pressure of two-thirds the specified water penetration pressure but not less than 6.2 psf (300 Pa).
   2. Water-Spray Test (Field Check): Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
      a. Perform tests on 5% (rounded up to nearest whole number) of aluminum-framed entrances and storefronts in areas as directed by Architect.
      b. Perform tests in each test area as directed by Architect. Perform tests, prior to 50, and 90 percent completion.

2

C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and/or inspections.

D. Prepare test and inspection reports.

3.05 ADJUSTING

A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.06 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08 62 70

TUBULAR DAYLIGHTING DEVICE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Tubular daylighting device system and accessories; configuration as indicated on the drawings.

1.02 RELATED SECTIONS

A. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings.

B. Division 26 - Electrical, Equipment Wiring, Electrical connections.

1.03 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008a.

D. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2006.

E. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2007.

F. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.

G. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.

H. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.

I. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.

J. ASTM E 1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

K. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricane.

L. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position; 2006.

M. ASTM D-1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).

N. UL 181 - Factory Made Air Ducts and Air Connectors

O. ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2008.

1.04 PERFORMANCE REQUIREMENTS

A. Completed tubular daylighting device assemblies shall be capable of meeting the following performance requirements:
   1. SOLAMASTER 750 DS-C (CLOSED CEILING)
      a. AAMA/WDMA/CSA 101/IS2/A440, Class CW-PG70, size tested 21 inch (530 mm) diameter, Type TDDOC and Type TDDCC.
         1) Air Infiltration Test:
            a) Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
         2) Water Resistance Test:
            a) Passes water resistance; no uncontrolled water leakage with a pressure differential of 10.7 psf (512 Pa) or 15 percent of the design load (whichever is greater) and a water spray rate of 5 gallons/hour/sf for 24 minutes when tested in accordance with ASTM E 547 and ASTM E 331.
         3) Uniform Load Test: All units tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
            a) No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 70 psf (3.35 kPa).
      b. Fire Testing:
         1) Fire Rated Roof Assemblies:
            a) When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the California Building Code for Class A, B, and C roof assemblies.
         2) When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the California Building Code.

3) Self-Ignition Temperature - Greater than 650 degrees F per ASTM D-1929.
4) Smoke Density: Rating no greater than 450 per ASTM E 84 in way intended for use. Classification C.
5) Rate of Burn and/or Extent: Maximum Burning Rate: 2.5 inches/min (62 mm/min) Classification CC-2 per ASTM D 635.
6) Rate of Burn and/or Extent: Maximum Burn Extent: 1 inch (25 mm) Classification CC-1 per ASTM D 635.

c. Fall Protection Performance:
1) Passes fall protection test: No penetration of dome or curb cap when subject to 400 lb (160 Kg)/42 inch (1066 mm) impact drop test when tested in accordance with OSHA 29 CFR 1926.506(c) Safety Net Systems.
2) Passes fall protection test: California State OSHA Fall Protection Code of Regulations, Title 8, Section 3212 (e)(1) Skylight Screens.

1.05 SUBMITTALS

A. 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.

B. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.

C. Verification Samples: As requested by Architect.

D. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engaged in manufacture of tubular daylighting devices for minimum 20 years.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 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.

1.09 WARRANTY

A. Daylighting Device: Manufacturer's standard warranty for 10 years.

B. Electrical Parts: Manufacturer’s standard warranty for 5 years, unless otherwise indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Solatube International, Inc., Vista, CA. Web: www.solatube.com

B. Or equal in accordance with Division 01 for substitutions.

2.02 TUBULAR DAYLIGHTING DEVICES

A. Tubular Daylighting Devices General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC AC-16.

B. SolaMaster Series: Solatube Model 750 DS, 21 inch (530 mm) Daylighting System:
   1. Model:
      a. Solatube Model 750 DS-C Closed (Penetrating) Ceiling. AAMA Type TDDCC.
   2. Capture Zone:
      a. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
         1) Outer Dome Glazing: Type DA, 0.125 inch (3.2 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV A), impact modified acrylic blend.
            a) Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
      b. Tube Ring: 0.090 inch (2.3 mm) nominal thickness injection molded high impact PVC. Prevents thermal bridging between base flashing and tubing and channel condensed moisture. Attached to base of dome ring with butyl glazing rope 0.24 inch (6 mm) diameter; to minimize air infiltration.
      c. Dome Seal: Adhesive backed weatherstrip, 0.63 inch (16 mm) tall by 0.28 inch (7 mm) wide.
   3. Flashings:
      a. Roof Flashing Base:
         1) One Piece: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube. Sheet steel, corrosion resistant conforming to ASTM A 653/A 653M or ASTM A 463/A 463M or ASTM A792/A 792M, 0.028 inch (0.7 mm) plus or minus .006 inch (.015 mm) thick.

a) Base Style: Type FC, Curb cap, with inside dimensions of 27 inches by 27 inches (685 mm by 685 mm) to cover curb as specified in Section 07 60 00.

b. Curbs: Metal Insulated Roof Curb: Corrosion resistant 18 Gauge hot-dipped galvanized steel conforming to ASTM A 653 G90 with continuous welded seams, integrated base plate for water tightness and extra strength, lined with 1-1/2 inch fiberglass fireproof sound attenuating thermal insulation, factory installed 2 by 2 treated wood nailer secured to top ledge of curb. Curb designed for single-ply roofing, lightweight fill or tapered insulation low slope roof types.
   1) C12 12 inch (305 mm) high Metal insulated curb
   2) Curbs provided by manufacturer.

c. Flashing Options:
   1) Curb Cap Insulation: Type CCI, Nominal 1 inch thick thermal insulation pad to reduce thermal conduction between curb-cap and tubing and thermal convection between room air and curb-cap. Rated R-6 (OFxft2xhr/Btu) Insulation is Polyisocyanurate foam utilizing CFC, HCFC, & HFC free blowing agent. Type-1 Class-1 per ASTM C 1289; Passes UL 1715 (15-minute thermal barrier per IBC 2603.4); Attic ventilation may be required per IBC 1203.2(OFxft2xhr/Btu). For use with Flashing Type FC.

4. Transfer Zone:
   a. Extension Tubes: Aluminum sheet, thickness 0.018 inch (0.5 mm) conforming to ASTM B 209.
      1) Reflective Tubes:
         a) Reflective extension tube, Type EXX and Type EL with total length of run as indicated on the Drawings.
         b) Interior Finish: Spectralight Infinity with INFRAREDuction Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance.
      2) Tube Options
         a) Extension Tube Angle Adapter: Provide manufacturer's standard adapters for applications requiring:
         b) Type A1 one 0 to 90 degree extension tube angle adapter.
         c) Type A2 two 0 to 90 degree extension tube angle adapters.
         d) Top Tube Angle Adapter and Bottom Tube Angle Adapter Kit: Type AK, Reflective 45 degree adjustable top and bottom angle adapters (one each), 16 inches (406 mm) long

5. Delivery Zone:
   a. Diffuser Assemblies for Tubes Penetrating Ceilings: Solatube Model 750 DS-C. Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube; 23.8 inches by 23.8 inches (605 mm by 605 mm) square frame to fit standard suspended ceiling grids or hard ceilings.
      1) Metal Transition Box: Type TM, Metal Round to Square transition box comprised of Spectralight Infinity SoftLight material with structured finish on exposed reflective surface, .015 in (0.4 mm) thick. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.

b. Lens: Type L1, OptiView Fresnel lens design to maximize light output and diffusion with extruded aluminum frame and EPDM foam seal to minimize condensation and bug, dirt and air infiltration per ASTM E 283. Visible Light Transmission shall be greater than 90 percent at 0.022 inch (0.6 mm) thick. Classified as CC2.

c. Delivery Zone Options:

1) Daylight Dimmer - 0 to 10 V Dimmer Control: Provide an electrical actuator controller, auxiliary switch(s), and cable as specified in Section 25 50 00; Common Work Results Electrical Section 26 05 00; and Lighting Equipment and Controls Section 26 50 00.

a) Low Voltage Daylight Dimmer: Type D1, is an Electro-mechanically actuated daylight valve; 0-10 V Control, Class-2, UL Listed. Low voltage Daylight Dimmer electrical actuator provides for programmable (0 to 10VDC) scene-based dimming control for daylight output between 2 and 100 percent, auxiliary 12VDC dimming control for daylight output between 2 and 100 percent, or auxiliary ON/OFF control. Input voltage: 24VAC at 50 or 60 Hz.

b) Programmable (0 to 10VDC) Control: requires an electrical actuator controller or building automation controller capable of producing a signal between 0 and +10 VDC (Min 50mA) to incrementally modulate up to 50 daisy chained Daylight Dimmers (Current Sinking) between fully closed at 0 to 1 volts to fully open at 9 to 10 volts.

c) Auxiliary 12VDC Dimming Control: requires 12VDC Dimming Switch (Current Sourcing; 12VDC power supply not required).

d) Requires CL-2 (Min), 18AWG, stranded copper, two conductor, twisted cable from lighting controller to first dimmer and interconnecting between subsequent dimmers

e) Auxiliary ON/OFF Control: requires commercial or residential single pole electric light switch.

f) ON/OFF control requires CL-2 (Min), 22 AWG, stranded, three conductor, twisted cable from switch to first dimmer and CL-2 (Min), 18 AWG, stranded copper, two conductor twisted cable; interconnecting subsequent dimmers.

d. Power can be transformed from line voltage through use of a UL Listed Class-2, 24VAC Transformer.

6. Accessories

a. Optional Low-voltage Transformer: Solatube Remote Transformer, Type TR20, is a 20VA, 24VAC, 50/60HZ, UL Listed, UL Category XOKV7, CE Marked, Class-2 Transformer with cover plate mounting system configured for easy field assembly onto standard 4.06 inch by 4.06 inch (103 mm by 103 mm) square junction box: Inherently Limited, Primary: 120VAC, 208VAC, 240VAC, and 277VAC. For use with Daylight Dimmer Type D1 only.

7. Catalog Number: S750DS-C-FC-CCI-AK-EXX-A1-A2-TM -L1-D1-TR20-C12

2.03 ACCESSORIES

A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.

B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.

C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 - EXECUTION

3.01 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.

3.02 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.

C. Coordinate requirements for power supply, conduit and wiring.

3.03 INSTALLATION

A. Install in accordance with manufacturer's printed instructions.

B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

2

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. After completion of installation and nominal curing of sealant and glazing compounds, but before installation of interior finishes, test for water leaks according to AAMA 501.2.

C. Perform test on 5% (rounded to the nearest whole number) of tubular daylighting systems.

D. Work will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.05 PROTECTION

2

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08 63 00

TRANSLUCENT ROOF ASSEMBLY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Insulated translucent roof panel assemblies.

B. Flashed and weather sealed.

C. Related Sections:
1. Section 05 12 00, Structural Steel.
2. Section 07 62 00, Sheet Metal Flashing and Trim.
3. Section 07 92 00, Joint Sealants.
4. Section 08 80 00, Glazing.

1.02 WORK INCLUDED:

A. Design, engineer, manufacture and installation of two panels insulated translucent skylights panel system. An assembly of two independent insulated single glazing polycarbonate panels in one integrated daylighting panel assembly, incorporated into a complete aluminum framed system that has been tested and warranted by the manufacturer as a single source system. The exterior single panel can be removed at any time, independently of the interior single panel and without exposing the building's interior. The interior single insulated panel remains intact for the life of the building envelope.

B. All anchors, brackets, and hardware attachments necessary to complete the specified structural assembly, weatherability and water-tightness performance requirements. All flashing up to but not penetrating adjoining work are also required as part of the system and shall be included.

C. Trained and factory authorized labor with supervision to complete the entire panel installation.

1.03 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bar, Rod, Wire, Shape and Tube.

C. ASTM D2244 - Calculation of Color Differences from Instrumentally Measured Color Coordinates.

D. UL 723 (ASTM E84) - Surface Burning Characteristics of Building Materials.

E. ASTM E283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.

F. ASTM E331 - Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

G. Chapter 24 and 26, California Building Code, 2019.

1.04 QUALITY ASSURANCE

A. The glazing panels must be evaluated and listed by recognized building code evaluation organization: International Council Evaluation Service Inc (ICC-ES)

B. Materials and Products shall be manufactured by a company continuously and regularly employed in the manufacturing, engineering, and designing, stocking and building of skylights using the specified material and system for a period of at least ten (10) years. Manufacturers shall provide a list of at least ten (10) projects having been in place a minimum of ten (10) years, with similar size, scope, climate and type.

C. Erection shall be by a factory-approved installer who has been in the business of erecting similar material for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.

D. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system, in accordance with the requirements of this specification.

1.05 SUBMITTALS

A. Submit shop drawings and color samples in accordance with Division 01.

B. Manufacturer shall submit written guarantee accompanied by substantiating data, stating that the products to be furnished are in accordance with or exceed these specifications.

C. The manufacturer shall submit certified test reports made by an independent organization. Reports shall verify that the material will meet all performance requirements of this specification. Previously completed test reports will be acceptable if they are indicative of products used on this project. Test reports required are:
   1. Self Ignition Temperature (ASTM 1929-3)
   2. Smoke Density (ASTM D-2843)
   3. Burning Extent (ASTM D-635)
   4. Interior Flame Spread (ASTM E-84)

5. Class A roof construction per ASTM E108, FM 4470, NFPA 256, UBC 32-7, ULC-S107, UL 790
6. Color Difference (ASTM D-2244-85)
7. Weathering Evaluation before and after exposure to 300°F, 25 minutes include Light Transmission and Color Change, per ASTM E-1175, and ASTM D-2244 respectively.
8. OSHA Life Safety Fall and Walk Through Protection for 300 lb. point load per STD 29 CFR 1910.23 (e)(8)
9. OSHA Life Safety STD 29 CFR - Impact loading by blunt object of 500 ft. lbs. per ASTM E-695-03
10. CalOSHA 600 lb load - California Code or Regulations, Title 8, Section 1623(b)(3) & Section 3212(b)
11. Insulation's 'U' value - Center of Glazing per NFRC100.
12. Insulation's 'U' value for skylight system, glazing and aluminum framing, per NFRC 100 & NFRC 700 certification.
13. Visible light Transmission (VT) per ASTM E972 & ASTM E1084
14. Solar Heat Gain Coefficient (SHGC) based on tests or calculations which are based on tests per methodology and procedure given in the NFRC/Calorimeter Standard.
15. Maximum air infiltration rate for fenestration assemblies, per NFRC 400 or ASTM E283.
16. Water Penetration (ASTM E-331)
17. Load Bearing Capability (ASTM E-330-97)
18. Performance of exterior windows, curtain walls when impacted by wind-borne debris per ASTM E 1996-02, Level D
19. Haze per ASTM D 1003 for glare measurement.
20. ICC evaluation service report.

1.06 MAINTENANCE DATA

A. The manufacturer shall provide recommended maintenance procedures, schedule of maintenance and materials required or recommended for maintenance.

B. Submit Installer Certificate signed by installer, certifying compliance with project qualification requirements.

1.07 WARRANTY:

A. Provide a single source skylight system manufacturer warranty against defective materials and fabrication. Submit manufacturer's written warranty agreeing to repair skylight system work, which fails in materials within one year from date of delivery.

B. Provide single source skylight's manufacturer 10 year glazing panel warranty. Third party warranty for glazing panels shall not be acceptable. Glazing warranty to include:
   1. Change in light transmission of no more than 6% per ASTM D-1003

2. No delamination of panel affecting appearance, performance or structural integrity of the panel or the system
3. Thermal aging - the light transmission and the color shall not change after exposure to heat of 300°F for 25 minutes (when measured per ASTM D-1003 and ASTM D-2244 respectively).

C. In addition submit installer's written warranty agreeing to repair installation workmanship, defects and leaks within one year from date of delivery.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. The design and performance criteria of this job are based on the Quadwall - 2 panel skylight systems as manufactured by CPI Daylighting, Inc.
   1. The system noted herein and the products have been submitted to DSA and the DSA approval is specific to these products indicated herein. If the contractor request a substitution of any of these products, systems or related items indicated he shall be responsible for the following:
      a. Approved equal shall meet or exceed performance items specified herein as a basis of design.
      b. Contractor shall secure DSA approval with assistance of the architect. All time spent with the architect in securing this approval shall be reimbursed by the Contractor at office billing rates.
      c. Any time spent by the Architect in coordinating the material substitution, reviewing items, trips to DSA, DSA communications, securing approvals and related items shall be reimbursed as aforementioned.

B. APPROVED MANUFACTURERS
   1. Other manufacturers may bid this project provided they comply with all requirements of the specification and submit evidence of compliance with all performance criteria specified herein. This evidence must include proof of conformance and test reports as per Article 1.05. Any exceptions taken from this specification must be noted on the approval request. If no exceptions are noted and approval is given, product performance will be as specified. Should non-compliance be subsequently discovered, the previously given approval will be invalidated and use of the product on the project will be disallowed. All manufacturers acceptable for use on this project under this section must be approved prior to bid. Requests for approval, with all appropriate submittal data and samples must be received no less than 10 days prior to bid date. A list of all approved manufacturers and products will be issued by addendum. No other manufacturers will be acceptable. No verbal approval will be given. Listing manufacturers' names in this specification does not constitute approval of their products or relieve them of compliance with all the performance requirements contained herein. Fiberglass skins are unacceptable**.** Single panel system in lieu of 2 panel system is unacceptable.

2.02 TRANSLUCENT PANEL PERFORMANCE AND APPEARANCE

A. Panel construction for Longevity and Resistant to Buckling and Pressure:
   1. Translucent panels must be constructed of tight cell sizes not exceeding 0.18". Wide cell l size exceeding 0.18"shall not be acceptable.
   2. The translucent panel shall include an integral extruded tight-cell structural core. The panel's exterior skins shall be connected with supporting continuous ribs, perpendicular to the skins, at a spacing not to exceed 0.18" (truss-like construction). In addition, the space between the two exterior skins shall be divided by multiple parallel horizontal surfaces, at a spacing not to exceed 0.18".

B. Translucent Skylight Panel - Two Panel Assembly:
   1. Design, engineer, manufacture and installation of two panel insulated translucent skylight system. An assembly of TWO independent insulated single panels of extruded polycarbonate into one glazing assembly, incorporated into a complete aluminum framed system that has been tested and warranted by the manufacturer as a single source system. The exterior insulated single panel can be removed at any time, independently of the interior insulated single panel and without exposing the building's interior. The interior insulated single panel remains intact for the life of the building envelope.
   2. Panel glazing assembly thickness shall be 4" two panel system with concealed interlocking H battens, grid and FR insert. Minimum thickness of the exterior and the interior single panels shall be 0.315" thick each.
   3. Panel Width: Shall not exceed 2' to ensure best performance for wind uplift, vibration, oil canning and visual appearance. Panels over 2' wide will not be approved.

C. Thermal and Solar Performance:
   1. Insulation "U" Value performance per NFRC100 & 700, is required by the California Energy Code. Such performance values must be certified and labeled by NFRC. Labels shall be displayed on the product. NFRC certified and labeled products shall be published in the Certified Products Directory (CPD) on the NFRC official web site.
   2. U value for standard panel assembly with no bat or aerogel insulation, Center of Glazing per NFRC 100**:** 0.20
   3. U value for panel system assembly with no bat or aerogel insulation and including skylight aluminum framing per NFRC100 & NFRC700: 0.31 (for mill finish frame)
   4. Optional - Custom U value with variety of added insulation inserts.
      a. Custom U value center of glazing only per NFRC100, U factor: .18
      b. Custom U value for a complete aluminum frame per NFRC100 & 700 U factor: [ ]
   5. Visible Light Transmission Center of Glass (V.T. %) 22 per ASTM E972 ASTM & E1084.
   6. Solar Heat Gain Coefficient (SHGC) 18 independently tested or calculated based on testing per methods and procedures given in the NFRC Calorimeter
   7. Standard Color: Exterior - Clear; Interior - White Matte

D. Translucent Panel Joint System:
   1. Panel shall be extruded in one single formable length. Transverse connections are not acceptable.
   2. The panels should be manufactured with grip-lock double tooth upstands that are integral to the unit. The upstands shall be 90 degrees to the panel face (standing seam dry glazed concept). Welding or gluing of upstands or standing seam is not acceptable.
   3. The H battens shall have a grip-lock double tooth locking mechanism to ensure maximum uplift capability.
   4. The metal retention clip shall be configured with a 0.4" wide top flange that extends continuously across the web from end to end and from side to side. To allow safety factor, the clip must be tested to meet a wind uplift standard of 90 PSF per ASTM E330. .
   5. Water Penetration: No water penetration of the panel H joint connection length at test pressure of 6.24 PSF per ASTM E-331
   6. Free movement of the panels shall be allowed to occur without damage to the weather tightness of the completed system.

E. Flammability:
   1. The exterior and interior panels shall be an approved light transmitting panel with a CC1 fire rating classification per ASTM D-635. Flame spread no greater than 25 per ASTM E-84. Smoke density no greater than 75 per ASTM D2843 and a minimum self-ignition temperature of 1000°F per ASTM 1929.
   2. Interior flame spread classification of Class A per ASTM E84.
   3. The translucent panel must be listed by an independent recognized listing laboratory after successful evaluation for fire from exterior exposure per ASTM E108, FM 4470, NFPA 256, UBC 32-7, ULC-S107, UL 790 to meet a Class A rating.

F. CalOSHA /OSHA Life Safety Standards 29 CFR 1926.502 (i) (2) and 29 CFR 1910.23 (e) (8):
   1. Panel assembly shall withstand a 300 lb. point load at 5' span per OSHA standard 29CFR 1910 23e8.
   2. Panel assembly shall withstand a 600lb point load over 12 square inches per CalOSHA California Code or Regulations, Title 8, Section 1623(b)(3) & Section 3212(b).

G. Cyclic Wind Load:
   1. Translucent Panels shall be tested for cyclic wind loads and impact resistance per ASTM E 1886-97 and ASTM E 1996-02 at test load to verify the positive and negative design loads and level D impact.

H. Weatherability:
   The light transmission shall not decrease more than 6% as measured by ASTM D-1003 over 10 years, or after exposure to temperature of 300°F for 25 minutes (thermal aging performance standard).
   1. The weathering performance should be justified by successful testing of the glazing panel's performance after exposure to actual Florida weather conditions

for approximately 10 years in comparison to a new panel assembly. This performance must be demonstrated by providing independent lab test reports for the exposed and a new panel assembly of 6' wide x 12' long for:
   a. ASTM 330 - Uniform static air pressure per at negative load of -105psf and positive load of 130psf.
   b. ASTM E695 - Impact loading per of 500 ft. lbs.
   c. ASTM 1886 & ASTM E1996 - Cyclic static air pressure at 65psf and impact level D
2. Test results must show that there is no deterioration in performance for the 10 year's exposed panels versus a new panel.
3. Panels shall be manufactured from polycarbonate resin with a permanent, co-extruded ultra-violet protective layer. Post-applied coatings or films of dissimilar materials are unacceptable.
4. The faces shall not become readily detached when exposed to temperatures of 300°F and 0°F for 25 minutes.
5. The panel shall not change color more than 4.0 units DELTA-E per ASTM D2244 after 60 months outdoor weathering in Arizona as determined by an average of at least two samples.
6. Thermal aging - the interior and exterior panel shall not change color in excess of 0.75 Delta E per ASTM D2244 and shall not darken more than 0.3 units Delta L per ASTM D2244 and shall show no cracking or crazing when exposed to 300°F for 25 minutes.
7. Panel shall be factory sealed at the sill to restrict dirt ingress.

I. Glare and Diffused Light Transmission: to avoid glare per IECC requirements, the panels shall have a matte finish with a minimum Haze measurement of 90% per ASTM D1003.

2.03 METAL FRAME STRUCTURE

A. Design criteria shall be:
   1. Negative design wind Load: See general notes on Structural Drawings.
   2. Positive design wind load: See general notes on Structural Drawings.

B. The skylight framing is designed to be self-supporting between the support constructions. The deflection of the structural framing members in a direction normal to the plane of the glazing, when subjected to a uniform load deflection, shall not exceed L/60 for the unsupported span. The skylight will impose reactions to the support construction. All adjacent and support construction must support the transfer of all loads including horizontal and vertical, exerted by the skylight. Design or structural engineering services for the supporting structure or building components is not included in the skylight scope of this section.

C. Water Penetration: The metal framed skylight panels shall allow no water penetration at a minimum differential static pressure of 6.24 lbs. per sqf per AAMA 501 pressure difference recommendations and as demonstrated by prior testing of typical framing sample per ASTM E-331

D. Water test of metal frame structure shall be conducted according to procedures in AAMA 501.2.

E. Maximum air infiltration rate for fenestration of the two panel assemblies of skylight shall be per NFRC 400.

2.04 METAL MATERIALS

A. Extruded Aluminum shall be ANSI/ASTM B221; 6063-T6: 6063-T5 or 6005-T5.

B. Flashing:
   1. 5005 H34 aluminum
   2. Sheet metal flashings/closures/claddings are to be furnished shop formed to profile - when lengths exceed 10 ft. in nominal 10-ft lengths. Field trimming of the flashing and field forming the ends is necessary to suit as-built conditions. Sheet metal ends are to overlap at least 6-inc. to 8-inc. set in a full bed of sealant and riveted if required.

C. All Fasteners for aluminum framing to be stainless steel or cadmium plated steel, excluding the final fasteners to the building.

D. Exposed Aluminum Finish:
   1. CPICRF™- PREMIUM polymer resin powder coat per AAMA 2604 with 10 years warranty.

PART 3 - EXECUTIONS

3.01 EXAMINATION

A. Verify when structural support is ready to receive all work in this section and to convene a Pre-Installation Conference at least one week prior to commencing work of this Section. Attendance required of General Contractor, skylight installer and all parties directly affecting and effected by the work of this section.

B. All submitted opening sizes, dimensions and tolerances are to be field verified by general contractor unless otherwise stipulated.

C. Installer shall examine area of installation to verify readiness of site conditions. Notify general contractor about any defects requiring correction. Do not work until conditions are satisfactory.

D. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install components in strict accordance with manufacturer's instructions and approved shop drawings. Use proper fasteners, caulking and hardware for material attachments as specified.

B. Use methods of attachment to structure allowing sufficient adjustment to accommodate tolerances.

C. Remove all protective coverings on panels immediately after installation.

D. Align assembly free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Install flashings.

F. Install perimeter type sealant, backing materials and installation requirements in accordance with Section 07 92 00.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
   1. Water-Spray Test: Before installation of interior finishes has begun, panel assemblies shall be tested according to AAMA 501.2 and shall not show evidence of water penetration.
   2. Perform tests on the whole translucent roof assembly.

B. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

C. Prepare test and inspection reports.

3.04 CLEANING

2

A. Follow manufacturer's instructions when washing down exposed panel surfaces using a solution of mild detergent in warm water that is applied with soft, clean wiping cloths. Always test a small area before applying to the entire area.

B. Follow strict panel manufacturer guidelines when removing foreign substances from panel surfaces requiring mineral spirits or any solvents that are acceptable for use. Always test a small sample to validate compliance before applying to the entire glazing panels

C. Installers shall leave panel system clean at completion of installation. Final cleaning is By others upon completion of project, following manufacturer's cleaning instructions.

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Glass and glazing for Sections referencing this Section for products and installation.

B. Related Section(s):
1. Section 08 41 13 Aluminum Entrances and Storefronts
2. Section 08 44 14 Glazed Aluminum Curtain Wall
3. Section 08 87 00 Solar Control Window Film
4. Energy calculations or prescriptive compliance documents

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. 2019 California Building Code, Chapter 24, Table 2403.2.1, Tables 2406.2(1) and 2406.2(2).

C. 2019 California Energy Code, Title 24, Part 6, Subchapter 2, Sections 110.6 and Subchapter 5, Section 140.3.

D. 2019 California Administrative Code, Chapter 10, Sections 10-111 and 10-112.

E. ASTM C1036 - Standard Specification for Flat Glass

F. ASTM C1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass

G. ASTM D792 - Density and Specific Gravity (Relative Density) and Density of Plastics by Displacement.

H. ASTM E 2190 - Insulating Glass Unit Performance and Evaluation

I. GANA - Glass Association of North America - Glazing Manual, Latest Edition

J. GANA - Glass Association of North America - Sealant Manual, Latest Edition

K. AAMA - 92, Voluntary Specification and Test Methods for Sealants

L. GTA - Glass Tempering Division of Glass Association of North America

M. LSGA - Laminators Safety Glass Association - Standards Manual

N. SIGMA - Sealed Insulated Glass Manufacturers Association - Glazing Manual

O. IGMA - Insulating Glass Manufacturers Alliance

P. Chapter 24 , 2019 California Building Code

Q. Section KCMZ, UL Fire Resistance Directory, Volume 3, Latest Edition.

R. California Code of Regulations, Title 24
   1. CBC California Building Code (CBC) 2019
   2. CRSC California Referenced Standards Code, Standard 12-7-4, fire door tests

S. NFPA-80 Fire Doors and Fire Windows

T. NFPA-257 Fire Test for Windows and Glass Block Assemblies

U. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing Material, Consumer Protection Safety Commission, Code of Federal Regulations. All glazing shall pass the test requirements of CPSC 16 CFR 1201, listed in Chapter 35. Comply with the CPSC 16 CFR, Part 1201 criteria, for Category I or II as indicated in Table 2406.1, CBC. Required for fully tempered glass, laminated glass, and wire Glass.

V. ANSI Z-97.1-84 (R1994) - Performance Specifications and Methods of Test for Transparent Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Method of Test. Required for fully tempered glass, laminated glass.

1.03 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass sloped 15 degrees or less from vertical in windows, curtain and window walls, doors and other exterior applications shall be designed to resist the wind load in Section 1609.6.4.4 and Table 1609.6.2(2). Glass in glazed curtain walls, glazed storefronts and glazed partitions shall meet the seismic requirements of ASCE 7, Section 13.5.9. Load resistance under uniform load per ASTM E1300.
   1. Sloped glass: CBC Section 2404.2 and Section 2405 Sloping Glass and Skylights.

C. Provide minimum frame lap in accordance with Table 2403.2.1, California Building Code and Note "*1*" for design wind and earthquake drift.

D. Glazing materials and assemblies shall be tested in accordance with California Referenced Standards Code, Standard 12-7-4 and NFPA 80 Fire Doors and Fire Windows and shall be labeled and installed in accordance with their listing.

E. Glazing in fire door and fire window assemblies subject to human impact loads and in hazardous locations shall comply with requirement of CBC Sections 2406.2 and 2406.4.

F. Air and Water Infiltration per ASTM E283 and ASTM E331.

G. Performance Rating: Glazing U-Factor, Relative Solar Heat Gain Coefficient and Visible Transmittance shall be rated in accordance with the T-24 Energy Report per maxima and minimum requirements in California Energy Code, Subchapter 5, Section 140.3(a)5 and Table 140.3-B.

H. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the CBC and ASCE 7/SEI 7.
   1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
      a. Basic Wind Speed (Ultimate design wind speed): 115 mph
      b. Seismic Importance Factor: 1.25 for schools, Category III
      c. Exposure Category: C
   2. Maximum Lateral Deflection: To be considered firmly supported, the framing members for each individual pane of glass shall be designed so the deflection of the edge of the glass perpendicular to the glass panel shall not exceed 1/175 of the glass edge length or 3/4-inch, whichever is less, when subjected to the larger of the positive or negative load where loads are combined as specified in CBC Section 1605A. CBC Section 2403.3.

1.04 SUBMITTALS

A. Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

B. Three samples of each material specified illustrating coloration and design.

C. Submit certification of Manufacturer’s Certified Fabricators.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Glass Fabricators: Member of manufacturer’s Certified Fabricator Program (CFP)
   1. Program members participate in rigorous training program on processing of sophisticated glass products, including high-performance coated glasses.
   2. Subject to comprehensive, multiple-day audit addresses glass fabrication equipment as well as their documented processing procedures.

C. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from single manufacturer for each product and installation method indicated.

D. Perform Work in accordance with:
1. GANA Glazing Manual.
2. GANA Sealant Manual.
3. LSGA Standards Manual.
4. IGMA/SIGMA Glazing Manual, Class CBA.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

1.07 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.08 COORDINATION

A. Coordinate the Work with glazing frames, wall openings, and perimeter air and vapor seal to adjacent Work.

1.09 WARRANTY

A. Provide one-year manufacturer's warranty from Date of Substantial Completion for defective products including broken, cracked or otherwise damaged glass not caused by vandalism. Water intrusion through sealant/glass joint.

B. Manufacturer's Special Warranty: Include 10 years coverage for sealed glass units from seal failure, interpane dusting or misting and replacement of same.

C. Manufacturer's Special Warranty: Include 10 year silver spoilage coverage for reflective coating on mirrors and replacement of same.

1.10 IDENTIFICATION

A. Each pane shall bear the manufacturer's mark designating the type and thickness of glass and glazing material. Conform to Section 2403.1, California Building Code. Safety glass shall be identified in accordance with CBC Section 2406.3.

B. Each pane of safety glazing material installed in hazardous locations required per Section 2406.1 and as defined in Section 2406.3 Chapter 24, California Building Code. Safety glass shall be identified by a label which will specify the labeler, whether the manufacturer or installer, and state that safety glazing material has been utilized in such installation.
1. Identification shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of that type once applied, cannot be removed without being destroyed, on glass and readable from inside of building after installation.
2. Label text shall comply with Section 2406.3.

C. Each pane of tempered glass, except tempered spandrel glass, shall be permanently indentified by the manufacturer. The identification mark shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of the type that once applied cannot be removed without being destroyed. Tempered spandrel glass shall be provided with a removable paper marking by the manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS - FLAT GLASS MATERIALS

A. Products of following manufacturers form basis for design and quality intended.
   1. Vitro Architectural Glass, Pittsburgh, PA.
   2. Guardian Industries Corp. Kingsburg, CA, Corsicana TX.
   3. Pilkington Libbey-Owens-Ford Co, Toledo, OH.
   4. Saint-Gobain Corp.

B. Products of following fabricators form basis for design and quality intended.
   1. Solutia/Vanceva Laminated Glass/Oldcastle, St. Louis, MO.
   2. Envelope Corp.
   3. ASI Glass/SCHOTT Group, Elmsford, NY.
   4. Viracon Inc. Owatonna, MN.

C. Or equal as approved in accordance with Division 01, General Requirements for Substitutions.

2.02 GLASS MATERIALS

A. GL1: Insulating Glass Units, Low-E Coated: double pane with silicone sealant edge secondary seal and polyisobutylene primary seal with aluminum spacer, clear anodized. Outboard lite of tinted 1/4 inch heat-strengthened glass, ASTM C1048, Kind HS. Inboard lite of 1/4 inch clear tempered, Kind FT, glass, Category I, CPSC 16 CFR 1201. Category II for units less than 18" above floor, and top edge greater than 36". Low-E coating on surface 2, interpane space purged dry air; total unit thickness of one inch. Solarban 70.
   1. Vitro Solarban 70 - Low- E Tinted Insulating Glass, sputter-coated
      a. Solarban 70 (2) Clear + Clear
         1) Visible Light Transmittance of 64%, solar heat gain coefficients of 0.27.

2

B. GL2: Insulating Glass Units, Low-E Coated with Solar Control Window Film: double pane with silicone sealant edge secondary seal and polyisobutylene primary seal with aluminum spacer, clear anodized. Outboard lite of tinted 1/4 inch heat-strengthened glass, ASTM C1048, Kind HS. Inboard lite of 1/4 inch clear tempered, Kind FT, glass, Category I, CPSC 16 CFR 1201. Category II for units less than 18" above floor, and top edge greater than 36". Low-E coating on surface 2, interpane space purged dry air; total unit thickness of one inch. Solarban 70.
   1. Vitro Solarban 70 - Low- E Tinted Insulating Glass, sputter-coated
      a. Solarban 70 (2) Clear + Clear
         1) Visible Light Transmittance of 64%, solar heat gain coefficients of 0.27

2

2. Solar Control Window Film on Surface 4 per Section 08 87 00, Solar Control Window Film.

C. GL3: Insulating Glass Units, Low-E Coated with Shadow Box: double pane with silicone sealant edge secondary seal and polyisobutylene primary seal with aluminum spacer, clear anodized. Outboard lite of tinted 1/4 inch heat-strengthened glass, ASTM C1048, Kind HS. Inboard lite of 1/4 inch clear tempered, Kind FT, glass, Category I, CPSC 16 CFR 1201. Category II for units less than 18" above floor, and top edge greater than 36". Low-E coating on surface 2, interpane space purged dry air; total unit thickness of one inch. Solarban 70.

1. Vitro Solarban 70 - Low- E Tinted Insulating Glass, sputter-coated
   a. Solarban 70 (2) Clear + Clear
      1) Visible Light Transmittance of 64%, solar heat gain coefficients of 0.29.

2
2. Shadow Box at Vision Glass: Screw attach formed sheet metal within mullion frame behind insulating glass, seal tight surrounding edges to prevent migration of warm moist air to inside shadow box. Paint metal per Architect's selected color. Drain cavity to exterior to prevent trapped condensation water. Provide rigid insulation behind sheet metal, insulation on interior side with foil faced surface.
   a. Mockup: provide mockup of shadow box for approval by Architect.

D. GL4: Insulating Glass Units, Low-E Coated with Solar Control Window Film and Shadow Box: double pane with silicone sealant edge secondary seal and polyisobutylene primary seal with aluminum spacer, clear anodized. Outboard lite of tinted 1/4 inch heat-strengthened glass, ASTM C1048, Kind HS. Inboard lite of 1/4 inch clear tempered, Kind FT, glass, Category I, CPSC 16 CFR 1201. Category II for units less than 18" above floor, and top edge greater than 36". Low-E coating on surface 2, interpane space purged dry air; total unit thickness of one inch. Solarban 70.

1. Vitro Solarban 70 - Low- E Tinted Insulating Glass, sputter-coated
   a. Solarban 70 (2) Clear + Clear
      1) Visible Light Transmittance of 64%, solar heat gain coefficients of 0.29.

2
2. Shadow Box at Vision Glass: Screw attach formed sheet metal within mullion frame behind insulating glass, seal tight surrounding edges to prevent migration of warm moist air to inside shadow box. Paint metal per Architect's selected color. Drain cavity to exterior to prevent trapped condensation water. Provide rigid insulation behind sheet metal, insulation on interior side with foil faced surface.
      1) Mockup: provide mockup of shadow box for approval by Architect.
3. Solar Control Window Film on Surface 4 per Section 08 87 00, Solar Control Window Film.

E. GL5: Safety Glass at all interior glazing, unless noted otherwise: ASTM C1048, Kind FT fully tempered, Condition A uncoated, Type I transparent glass, Class 1 Clear, Quality-Q3 Glazing select, 3/8 inch thick minimum. All safety glass shall pass the test requirements of CPSC 16 CFR 1201 criteria, for Category I or II as indicated in Table 2406.2(1), CBC and below, and for Hazardous locations per Section 2406.4:

1. 9 sq. ft. or less: Category I
2. More than 9 sq. ft.: Category II
3. Refer to Section 10 22 19 for additional glazing information at Demountable Partitions.

F. GL6: Safety Glass with Shadow Box: ASTM C1048, Kind FT fully tempered, Condition A uncoated, Type I transparent glass, Class 1 Clear, Quality-Q3 Glazing select, 3/8 inch thick minimum. All safety glass shall pass the test requirements of CPSC 16 CFR 1201 criteria, for Category I or II as indicated in Table 2406.2(1), CBC and below, and for Hazardous locations per Section 2406.4:
1. 9 sq. ft. or less: Category I
2. More than 9 sq. ft.: Category II
3. Shadow Box at Vision Glass: Screw attach formed sheet metal within mullion frame behind insulating glass, seal tight surrounding edges to prevent migration of warm moist air to inside shadow box. Paint metal per Architect's selected color. Drain cavity to exterior to prevent trapped condensation water. Provide rigid insulation behind sheet metal, insulation on interior side with foil faced surface.
   a. Mockup: provide mockup of shadow box for approval by Architect.

2.03 MIRROR GLASS

A. Mirror Glass: Vinyl-backed safety mirror glass , per CPSC 16 CFR 1201, Category II and ANSI Z-97.1, 1/4 inch thick minimum, sizes as noted on Drawings.
1. Frame: Frame face 3/4 x 3/4 inch welded seamless stainless steel, No. 304 finish, 20 gauge galvanized steel backing, Series No. 290, by Bobrick Washroom Equipment Inc., North Hollywood, CA, or equal.
2. Edges: Flat polished edges.
3. Mounting: concealed mounting wall hangers with theft-resistant locking devices.
4. For unframed mirrors: stainless steel edge channels at top and bottom and mastic bond to wall. Flat polish, ground arris (bevel) at exposed edges, UNO.
5. Mirror Mastic: Adhesive setting compound and barrier coat, produced specifically for setting mirrors, compatible with glass coating and substrate on which mirrors will be installed, Gunther Mirror Mastics, Palmer Products Incorporated or equal.

2.04 GLAZING ACCESSORIES

A. Setting Blocks: 80-90 Shore A Durometer Hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: 40-50 Shore A Durometer Hardness, minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self-adhesive on one side.

C. Glazing Tape, minimum 1/8" thick, 1/2" wide, the following:
1. Preformed butyl compound with integral resilient tube spacing device; 10 - 15 Shore A Durometer Hardness; coiled on release paper; black color.

2. Expanded Cellular Glazing tape, closed-cell, PVC foam tapes, factory coated with adhesive of both surfaces, coiled with released liner, complying with AAMA 800. Type 1 for tape acting as primary sealant, Type 2 tape combination with full bead of sealant.

D. Glazing Splines: Resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot.

E. Sealants: for color sealants; DowSil 795 Silicone or as specified in Section 07 92 00. Use Pecora 895 Structural Glazing for translucent and structural glazing applications or Tremco Spectrem 2 clear or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify prepared openings.

B. Verify that openings for glazing are correctly sized and within tolerance.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Mirror Glass: flat polish edge treatment. Edge Sealer: Seal edges for mirror glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.

3.03 EXTERIOR - DRY METHOD (PREFORMED GLAZING)

A. Cut glazing spline to length; install on glazing pane. Seal corners by butting spline and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing. Exert pressure for full continuous contact. Seal stop-screw holes and fill screw tips with silicone before installing.

3.04 EXTERIOR - DRY/WET METHOD (PREFORMED TAPE AND SEALANT)

A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

B. Apply toe bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

D. Rest glazing on setting blocks and push against tape and toe bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

E. Install removable stops, with spacer shims inserted between glazing and applied stops 1/4 inch below sight line. Place glazing tape on glazing panel or unit with tape flush with sight line. Seal stop screw holes and fill screw tips with silicone before installing.

F. Fill gap between glazing and stop with silicone type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

G. Apply cap bead of silicone type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.05 EXTERIOR - WET METHOD (SEALANT AND SEALANT)

A. Place setting blocks at 1/4 points and install glazing pane or glass unit.

B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line. Seal stop screw holes and fill screw tips with silicone before installing.

C. Fill gaps between glazing and stops with silicone type sealant to depth of bite on glazing, but not more than 3/8 inch below sight line, to ensure full contact with glazing and continue the air and vapor seal.

D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.06 INTERIOR - DRY METHOD (TAPE AND TAPE)

A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

D. Place glazing tape on free perimeter of glazing in same manner described above.

E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact. Seal stop screw holes and fill screw tips with silicone before installing.

F. Knife trim protruding tape.

3.07 INTERIOR – DRY/WET METHOD (TAPE AND SEALANT)

A. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or glass unit.

D. Install removable stops, with spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line. Seal stop-screw holes and fill screw tips with silicone before installing.

E. Fill gaps between pane and applied stop with silicone type sealant to depth equal to bite on glazing, to uniform and level line.

F. Trim protruding glazing tape edge.

3.08 MANUFACTURER'S FIELD SERVICES

A. Glass and glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures, unacceptable conditions and report deficiencies to the Architect.

3.09 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean and polish surfaces and frames.

3.10 PROTECTION OF FINISHED WORK

A. Protect finished Work.

B. After installation, mark pane with an 'X' by using removable plastic tape or paste. Do not mark heat absorbing glass units.

END OF SECTION

SECTION 09 90 00

PAINTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Fluid applied paints and coatings. Upon completion of Work, all visible interior and exterior surfaces, within the Contract limits [including factory primed or factory finished roof mounted mechanical and electrical equipment,] shall be painted unless scheduled "Not to Be Painted in this Section."
   1. Each paint system includes:
      a. Surface preparation, including touch-up of shop applied primers, if needed.
      b. Prime coat application, where scheduled as part of finish system.
      c. Finish coat application, where scheduled apply two or more finish coats.
   2. Paint semi-concealed areas (e.g. inside of light troughs and valances, behind grilles, and projecting edges above and below sight lines, behind wall-mounted items).

B. Surfaces Not to be Painted:
   1. Prefinished wall, ceiling, and floor coverings.
   2. Items with factory-applied final finish [except roof-mounted equipment as defined above].
   3. Concealed ducts, pipes, and conduit.
   4. Glass, plastic laminate, ceramic tile, anodized aluminum.
   5. Surfaces of steel items that will be embedded in concrete.
   6. Surfaces specifically scheduled or noted on the Drawings not to be painted.
   7. Fire-Rating labels on doors and frames.
   8. Performance labels on doors and frames.

C. Related Sections:
   1. Section 01 35 42, CALGreen Requirements.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM International - American Society for Testing and Materials
   1. ASTM D 4442 - Direct Moisture Content Measurement of Wood and Wood-Base Materials.
   2. ASTM D 4444 - Use and Calibration of Hand-Held Moisture Meters.
   3. ASTM D 6386 - Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.

C. California Green Building Standards Code, CALGreen 2019.

D. SCAQMD - South Coast Air Quality Management District: SCAQMD-1113 - Rule 1113, Architectural Coatings.

E. SSPC - Steel Structures Painting Council.

1.03 SUBMITTALS

A. CALGreen Submittals:
   1. Product Data Sheets and Declaration Statements showing compliance with CALGreen Code per 1.06.A.

B. Product Data: For each paint system product and accessory item.
   1. Container Labels and Technical Data Sheets shall contain the same/complete product name and numbers. The word "series" will not be excepted.

C. Samples: Of each specified finish system color, texture, and sheen; samples shall be minimum 8-1/2 by 11 inches in size.
   1. Prepare transparent wood finish samples on type and quality of wood specified.

D. Certified copies of moisture test results.

E. Informational Submittals:
   1. Statement of Qualifications from manufacturer.
   2. Statement of Qualifications from installer.
   3. Manufacturer’s application instructions.

2

F. Closeout Submittals:
   1. Material Safety Data Sheets.
   2. Drawdown samples with the manufacturer's same/complete product name and numbers. The word "series" will not be excepted.

G. Submit Qualifications data for manufacturer and applicator required under Quality Assurance.

2

1.04 MAINTENANCE MATERIALS AND SUBMITTALS

A. For each color, type, and gloss of paint used in the work provide, as Extra Materials, a quantity equal to approximately 5 percent of the quantity required for its installation rounded to the nearest gallon, or five gallons, whichever is less.
   1. Extra Materials shall be from the same production run as installed materials.
   2. Label each container with locations and dates of related installations; do not obscure manufacturer’s label.
   3. Deliver Extra Materials to Site as directed by Owner.

1.05 QUALITY ASSURANCE

A. California Green Building Standards Code, CALGreen 2019.
   1. Adhesives, sealants, primers and caulks shall comply with air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, per CALGreen Tables 5.504.4.1 and 5.504.4.2.

2. Paints and Coatings shall comply with VOC limits in Table 1 of the ARB, per CALGreen Table 5.504.4.3.

B. Manufacturer's Qualifications: Company with minimum 10-years' experience manufacturing quality paint and finish products for commercial projects similar in scale and complexity to those required for this Project.

C. Applicator Qualifications: Company with minimum 5-years' experience painting and finishing commercial projects similar in scale and complexity to those required for this Project.

D. Materials, for each paint system, shall be by, or as recommended by, a single coating manufacturer for use together in commercial quality paint / coating system for the substrate and exposure conditions indicated.

E. Regulatory Requirements
1. Conform to SCAQMD-1113 for maximum VOC limits.
2. Comply with applicable codes and regulations of authorities having jurisdiction including those with jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provisions.

F. Field Samples: Provide Field Sample of each finish system color, texture, and sheen scheduled. Do not proceed with coating application until sample panel has been approved.
1. Field Sample shall be full height of wall by 10-feet.
2. Locate as approved by Architect.
3. Adjust materials and methods of installation as required to obtain Architect's approval.
4. Document materials and methods used to obtain Architect’s approval and maintain at least one copy of this documentation on site while related work is in progress.
5. Maintain access to and protect Field Sample from damage while related work is in progress.
6. Upon acceptance of related work, approved sample may remain as part of Work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site in their original, sealed, undamaged containers with labels intact and legible.
1. Labels shall include manufacturer’s name, type of paint, brand name, brand code, color designation, recommended surface preparation, typical coverage, drying times, cleanup procedures, and instructions for mixing and reducing, if permitted.

B. Store paint materials ambient temperatures between 45- and 90-degrees F, in well ventilated area unless permitted otherwise by manufacturer’s instructions.

C. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.07 FIELD CONDITIONS

A. Supply continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45-degrees F for 24-hours before, during and 48-hours after application of finishes, unless permitted otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain, or when relative humidity is above 50 percent, unless permitted otherwise by manufacturer's instructions.

C. Minimum application temperatures for Latex Paints: 45-degrees F for interiors; 50-degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum application temperature for Varnish and Transparent Finishes: 65-degrees F for interior or exterior, unless permitted otherwise by manufacturer's instructions.

E. Maintain lighting level sufficient to conduct painting operations.

1.08 GUARANTEE

A. Guarantee the painting Work against peeling, fading, cracking, blistering or crazing for a period of two years form the Date of Certified Completion for painting of new surfaces and existing surfaces.

PART 2 - PRODUCTS

2.01 PAINTS AND COATINGS

A. Acceptable Manufacturers: Products of following manufacturers form basis for design and quality intended.
   1. Dunn-Edwards Corporation, Los Angeles, CA.

B. Or equal, approved in accordance with Division 01, General Requirements, for substitutions.

2.02 MATERIALS

A. Coatings: Ready mixed, except field-catalyzed coatings. Process pigments to soft past consistency, capable of being readily and uniformly dispersed to homogenous coating.

B. Colors and Glosses: As scheduled in Finish Schedule on Drawings. Architect will select color and hue to be used in various types of paint specified and will be sole judge of acceptability of various glosses obtained from materials proposed to be used in Work. During actual painting, Architect may make minor modifications in tone and shade to adjust for actual surface and lighting conditions encountered.

C. Undercoats and Thinners: Provide undercoat paint produced by same manufacturer as finish coat. Use only thinners recommended by paint manufacturer and use only to recommended limits. Use undercoat, finish coat and thinner material as parts of a unified system of paint finish.

D. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

E. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified of commercial quality.

2.03 APPLICATION EQUIPMENT

A. For application of the approved paint, use only such equipment as is recommended by the manufacturer.

B. Compatibility: Prior to actual use of application equipment, use all means necessary to verify that the proposed equipment is actually compatible with the material to be applied and that the integrity of the finish will not be jeopardized by the use of the proposed application equipment.

2.04 FINISHES

A. Refer to schedule at end of Section for surface finish and Finish Schedule. Notwithstanding product numbers listed in schedule, Contractor shall conform to most recent product numbers as published by the manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of Work. Report any condition that may potentially affect proper application.

C. Measure moisture content of new surfaces using an electronic moisture meter. Apply finishes only when moisture content of surfaces are below the following maximums. Conduct moisture measurements in presence of the project inspector, document readings and submit to Architect under Part 1.
   1. Gypsum Wallboard: 12 percent.
   2. Interior Located Wood: 15 percent, measured in accordance with ASTM D 4442 and ASTM D 4444.

D. Beginning installation means acceptance of existing surfaces and conditions.

3.02 MATERIALS PREPARATION

A. Mix and prepare painting material in accordance with manufacturer’s recommendations.

B. Store materials not in actual use in tightly covered containers.

C. Maintain containers used in storage, mixing and application of paint in a clean condition, free from foreign materials and residue.

D. Stir all materials before application to produce a mixture of uniform density and as required during the application of materials. Do not stir into the material any film that may form on the surface. Remove the film and strain the material before using.

3.03 SURFACE PREPARATION

A. Remove electrical plates, hardware, light fixture trim and fittings prior to preparing surfaces for finishing.

B. Correct minor defects and clean surfaces which surfaces which affect Work of this section.

C. Shellac and seal marks that may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Insulated Coverings: Remove dirt, grease and oil from canvas and cotton.

F. Gypsum Board Surfaces: Fill minor defects, joints and nail head depressions with spackling compounds. Prime in accordance with primer manufacturer’s recommendations. Apply primer over skim coat for Level 5 finish.

G. Surface Preparation for Exterior Metal (Except Galvanized): Preparation in accordance with SSPC-6 Commercial Blast Cleaning.

H. Galvanized Surfaces:
   1. Prepare galvanized steel and nonferrous metal surfaces in accordance with SSPC-SP16 Brush Off Blast Cleaning Method for Coating and Uncoated Galvanized Steel and Non Ferrous Metals OR ASTM D 6386-Surface Preparation of Galvanized Surfaces, and as well as manufacturer's instructions.
   2. Ensure surfaces are dry.
   3. Interior Exposure (Dry/Benign): Remove visible, oil, grease, dirt, dust, protective mill coatings, and other soluble contaminants in accordance with SSPC-SP 1 or manufacturer’¢s instructions as specified for coating system. Hand or Power tool clean to remove all insoluble contaminants.
   4. Interior and Exterior Exposure (moderate to severe): Remove visible oil, grease, dirt, dust, protective mill coatings, and other soluble contaminants in accordance with SSPC-SP 1 or manufacturer’¢s instructions as specified for coating system. Follow initial cleaning with one of the following Methods:
      a. SURFACE PREPARATION METHOD A (Preferred): Prepare Galvanized Steel to be painted according to SSPC-SP16 Brush Off Blast Cleaning for Coated and Uncoated Galvanized Steel and Non Ferrous Metals OR Thoroughly roughen the entire surface to be coated using compressed air brush off blast cleaning with a fine abrasive to achieve a uniform anchor profile of 1-2 mils. reference ASTM D 6386-99 Section 5.4.1.

b. SURFACE PREPARATION METHOD B (Alternative method when Method A is not feasible): Chemically Treat with one of the following products to etch the galvanized surface to be coated: Henkel Galvaprep 5 or Clean ‘Ün Etch by Great Lakes Laboratory. Reference ASTM D 6386-99 Section 5.4.2.

I. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Prime paint after repairs with Tnemec Series L69 Hi Build Epoxoline II or Carboline 890 VOC or approved in accordance with Division 01, General Requirements for Substitutions.

J. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Spot prime bare steel surfaces to match existing primer.

K. Wood Scheduled to Receive Paint Finish: Remove dust, grit and foreign matter. Seal knots, pitch streaks and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

L. Wood Doors and Cabinet Work schedules for field-applied transparent or solid stain finish:
1. Sand surfaces thoroughly with a 5/0, 180 grit sandpaper.
2. Apply coatings as specified in the schedule to all surfaces, sides and edges. Avoid streaking or uneven application. Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail or screw holes, or other surfaces imperfections.
3. Stains as selected by Architect from manufacturer’¢s full range of colors.
4. Provide satin finish for final coats.

M. Wood Doors Scheduled for Painting: Seal top and bottom edges with primer. Leave labels intact and readable.

N. Door and Window Frames, Side Lights, Jambs and Headers: clean and light sand smooth.

3.04 PROTECTION

A. Protect elements surrounding the Work of this Section from damage or disfiguration.

B. Repair damage to other surfaces caused by Work of this Section.

C. Furnish drop cloths, shields and protective methods to prevent spray or droppings from disfiguring other surfaces.

D. Remove empty paint containers from site.

3.05 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish. Number of coats specified is a minimum. Additional coats shall be applied at no extra cost, if coatings show evidence of uneven application, uneven pigmentation, brush strokes or otherwise unsatisfactory distribution of material.

D. Under coats shall be lighter and brighter in tint that finish coat.

E. Sand lightly between coats to achieve required finish.

F. Allow applied coat to dry before next coat is applied.

G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

H. Prime back surfaces of interior and exterior woodwork with primer paint.

I. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with floss varnish reduced 25 percent with mineral spirits.

J. Seal tops, bottoms and cutouts for hardware and accessories of wood doors.

K. Paint Frames: Split paint door frames to match color of walls on each side of opening unless directed otherwise by Architect.

L. Exterior fascia, trims, reveals, and ornamental fences and gates shall receive accent paint colors different from field paint color.

M. Paint finish shall continue through behind all wall-mounted items (e.g. markerboards, chalk and tack boards).

3.06 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Divisions 22, 23, and 26 for color coding and identification banding requirements of equipment, ductwork, piping and conduit.

1. Unless otherwise indicated, conform to the following color coding system:

PIPING	COLOR	MANUFACTURER
Chilled Water	Vista Gray	Benjamin Moore
Condensed Water	Canvas Tan	Sherwin Williams SW1129
Domestic Hot Water	Admiral Blue	Benjamin Moore 2065-10
Domestic Cold Water	Edison Blue	-
Clinical Air	Bright Yellow	Benjamin Moore
Plant Air	Clear Lacquer	-
Vacuum	Shasta White	-
Oxygen	John Deere Green	Coast-to-Coast 555-2221-2744-02

	Rust-Oleum H-3-matches 594 green	
	Pittsburg 9-15	
	PPG PT-60	
Nitrous Oxide	OSHA Blue	OSHA's Website
Cold Soft Water	OSHA Violet	OSHA's Website
Steam Caterpillar	Yellow	Rust-Oleum H-4
Soil Waste	Loam Brown	-
Nitrogen	OSHA Black	OSHA's Website
Fire	OSHA Red	OSHA's Website
Fuel Gas	OSHA Orange	OSHA's Website
Deionized Water	Light Blue	Benjamin Moore

2. Verify appropriate specific color designations with paint manufacturer.
3. Conform to Owner's special requirements for color coding. Match existing coding system where required.

B. Paint shop primed equipment.

C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

D. Paint mechanical wall louvers, grilles to match adjacent wall surfaces at accent paint finish.

E. Prime and paint insulated and exposed pipes, electrical equipment including panelboards and switch gear, conduit, boxes, insulated and exposed ducts, hangers, metal louvers, brackets, collars and supports, when exposed to view in equipment rooms and finished occupied spaces. Except items that are pre-finished.

F. Replace identification markings on mechanical or electrical equipment when painted accidently.

G. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers and grilles to match face panels.

H. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

I. Color code equipment, piping, conduit and exposed ductwork in accordance with requirements indicated. Color band and identify with flow arrows names and numbering, using stencils or other approved systems.

J. Replace electrical plates, hardware, light fixture trim and fittings removed prior to finishing.

3.07 CLEANING

A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.

B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris.

C. Collect cotton waste, cloths, and material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.08 FINISH SYSTEM SCHEDULE - EXTERIOR EXPOSURE

A. Ferrous - Eggshell - Acrylic
   1. Primer, 1 Coat
      a. Dunn-Edwards BRPR00
   2. Tie Coat, 1 Coat
      a. Dunn-Edwards SSHL30
   3. Finish, 1 Coat
      a. Dunn-Edwards SSHL30

B. Ferrous - Factory Primed: If shop primer is compatible with finish materials, clean and touch-up prime coat in lieu of full primer coat then apply paint finish as specified.

C. Galvanized Steel and Aluminum - Eggshell - VOC Compliant:
   1. Surface Prep
      a. Dunn-Edwards SCME-01
   2. Primer, 1 Coat
      a. Dunn-Edwards ULGM00
   3. Finish, 2 Coats
      a. Dunn-Edwards SSHL30

3.09 FINISH SYSTEM SCHEDULE - INTERIOR SURFACES

A. Gypsum Board - Eggshell - Acrylic (Skim Coat Required for Level 5 Finish):
   1. Primer, 1 Coat
      a. Dunn-Edwards VNPL00
   2. Tie Coat, 1 Coat
      a. Dunn-Edwards SWLL30
   3. Finish, 2 Coats
      a. Dunn-Edwards SWLL30

B. Ferrous - Eggshell - Acrylic:
   1. Primer, 1 Coat
      a. Dunn-Edwards BRPR00
   2. Tie Coat, 1 Coat
      a. Dunn-Edwards SWLL30
   3. Finish, 2 Coats
      a. Dunn-Edwards SWLL30

C. Ferrous - Factory Primed: If shop primer is compatible with scheduled finish, clean and touch up prime coat then apply finish as scheduled.

D. Galvanized and Aluminum - Eggshell - Acrylic:
   1. Surface Prep

a. Dunn-Edwards SCME-01
2. Primer, 1 Coat
a. Dunn-Edwards ULGM00
3. Finish, 2 Coats
a. Dunn-Edwards SWLL30

3.10 SPECIAL COATING SYSTEMS

A. High Performance Coatings (Special Coatings): Exterior; metal handrails, railings, guardrails, roof sheet metal flashings, ladders, galvanized structural steel, structural steel, Architecturally Exposed Structural Steel (AESS), roof screens, trash and equipment enclosures, exterior metal stairs, roof hatches, and scheduled items in Section 05 50 00 Metal Fabrications. Total 5.0 to 8.5 mil thickness, as recommended by the manufacturer. Colors to be selected by Architect. Prepare surfaces and apply finishes per manufacturer's specifications.
1. Unprimed or Shop Primed - Ferrous - Gloss - Polyurethane:
a. Primer, 1 Coat
1) PPG Amerlock 2 VOC
2) Tnemec L69
3) Sherwin Williams B58-620
4) Carboline Carbomastic 15
b. Finish, 2 Coats
1) PPG Amerishield VOC
2) Tnemec 1080
3) Sherwin Williams B65-625
4) Carboline Carbothane 134 MC
2. Unprimed or Shop Primed - Ferrous - Semi-Gloss - Polyurethane:
a. Primer, 1 Coat
1) PPG Amerlock 2 VOC
2) Tnemec L69
3) Sherwin Williams B58-620
4) Carboline Carboguard 890 VOC
b. Finish, 2 Coats
1) PPG Amershield VOC
2) Tnemec 1081
3) Sherwin Williams B65-630
4) Carboline Carbothane 133 VOC
3. Galvanized or Aluminum - Gloss - Polyurethane:
a. Primer, 1 Coat
1) PPG Amerlock 2 VOC
2) Tnemec L69
3) Sherwin Williams B58-620
4) Carboline Galoseal WB
b. Finish, 2 Coats
1) PPG Amerishield VOC
2) Tnemec 1080
3) Sherwin Williams B65-625
4) Carboline Carbothane 134 MC
4. Galvanized or Aluminum - Semi-Gloss - Polyurethane:

a. Primer, 1 Coat
   1) PPG Amerlock 2 VOC
   2) Tnemec L69
   3) Sherwin Williams B58-620
   4) Carboline Carboguard 890 VOC
b. Finish, 2 Coats
   1) PPG Amerishield VOC
   2) Tnemec 1081
   3) Sherwin Williams B65-630
   4) Carboline Carbothane 133 MC

END OF SECTION

SECTION 12 59 17

WALL SYSTEMS FURNITURE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Structural wall framing system

B. Wall skins.

C. Frames for doors and glazed openings.

D. Doors and door hardware.

E. Glass and Glazing.

F. Misc. trims for junctions and building interface.

G. Modular power, monitor shrouds and other technology interface

H. Acoustic insulation.

1.02 PERFORMANCE REQUIREMENTS AND REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ANSI/BIFMA
1. Wall units will support a maximum load of 331 lbs. per linear foot per side in compliance with ANSI/BIFMA X 5.6.

C. ASTM: American Society for Testing and Materials
1. ASTM E84 “Standard Method for Surface Characteristics of Building Materials”.
2. ASTM E 72 “Standard Test Methods of Conducting Strength Tests of Panels for Building Construction”.
3. ASTM E 90 “Method for Laboratory Measurements of Airborne Sound Transmission Loss of Building Partitions”.

D. Underwriters Laboratories
1. Pre-wired modular power components shall be UL 183 listed

E. 2019 California Building Code.

F. 2019 California Electrical Code.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data for specified products.

B. Submit detailed shop drawings, showing all elements of the system, including fabrication and installation details, fastenings, accessories, types of material and finishes.

C. Shop drawings to include product reference detail to link individual wall components to factory orders and packing lists.

D. Product certification of compliance with specified performance characteristics and criteria, and physical requirements.

E. Manufacturer’s installation and assembly instructions.

F. Closeout Submittals

G. Warranty documents as specified.

H. Maintenance data.

1.04 QUALITY ASSURANCE

A. Installation shall be by manufacturer’s or a qualified dealer's trained personnel.

B. Supplier shall take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work.

1.05 DELIVERY, HANDLING AND STORAGE

A. Deliver wall components containerized, cartoned or crated to provide protection during transit. Include with bid any necessary storage precautions required for the product being offered.

B. Installation shall not commence until building is enclosed and climate controlled, and finishing operations, including adjacent walls, ceiling (including lighting, sprinklers & HVAC), floor-covering and painting, are complete.

C. Relocatable wall installer to inspect partition components upon delivery for damage. Minor damages may be repaired provided the finish items are equal in all respects to new work and acceptable to the owner’s representative. Remove and replace damaged items as described.

D. It shall be the responsibility of the wall supplier to properly package all components for storage and define storage program to be provided on site by General Contractor at no charge, to ensure product performance.

E. Relocatable wall components shall be tagged and labeled with identification numbers that correspond to product reference numbers as called out on shop drawings.

1.06 WARRANTY

A. Submit manufacturer's standard warranty document. Product shall be covered under limited lifetime warranty.

PART 2 - PRODUCT

2.01 ACCEPTABLE MANUFACTURERS AND MODELS

A. Steelcase, Grand Rapids, MI Model: IRYS POD

B. Or approved equal in accordance with Division 01, General Requirements for Substitutions.

2.02 RELOCATABLE WALL SYSTEM

A. Refer to Finish Schedule on Drawings for Finishes.

B. Relocatable, non-progressive, capable of four direction lateral expansion with reusable components.
   1. Wall Thickness: 4" nominal
   2. Wall height: 8'-1.25" high
   3. Vertical and horizontal joinery: ¼" reveal
   4. Utility Wireways: Provide access through structural framing, junctions, end conditions and utility panels.

C. Performance Requirements
   1. Solid painted wall assemblies to have a Class-A rating in accordance with ASTM E84-97a "Standard Method for Surface Characteristics of Building Materials".
   2. All solid and framed glass systems are in compliance with ASTM E 72 "Standard Test Methods of Conducting Strength Tests of Panels for Building Construction".
   3. Solid wall sound attenuation capabilities will range from a minimum (requiring no field additive insulation or gaskets) of 42 STC to a maximum STC level of 52.
   4. Glazed wall sound attenuation capabilities will range from a minimum of 30 STC to a maximum STC level of 33 for single glazed construction, and

will range from a minimum of 42 STC to a maximum STC level of 44 for double glazed construction.

5. Solid wall units will support a maximum load of 331 pounds per linear foot per side in compliance with ANSI/BIFMAX5.6.

D. Wall design will accommodate ceiling heights up to 12’-0”

E. Solid skins and glass frames shall be vertically oriented up to 142” high or landscape oriented up to 120” wide

F. Vertically oriented skins and glass frames shall be a maximum of 60” wide. Landscape oriented skins and glass frames shall be a maximum of 60” high

G. Design must permit extension in two, three or four way conditions without removal of adjacent panels or floor track

H. All solid and fabric skins shall be capable of field cutting to accommodate end filler conditions or other modifications to overall partition length

I. The system shall provide a 3” vertical adjustment (+/-1½ ") in overall height to accommodate floor and ceiling irregularities, allowing for a maximum of +/- 3/4 " at the floor and +/- 3/4 " at the ceiling, including wall assemblies, doors and door frames.

2.03 WALL COMPONENTS

A. Solid skins shall be ¾” thick, with surfaces of powder coat painted steel (22 gauge), fabric wrapped steel, veneer, or laminate (LPL or HPL), enclosing a particle board substrate.

B. Markerboard skins will be clad with ceramic steel dry-erase surfaces.

C. Markerboard skin options to include embedded technology for interacting with projectors and computers.

D. Monitor shrouds will allow for surface mounting of display monitors with minimal projection from face of wall.

1. Different monitor sizes can be used without changing wall components
2. Monitors will not be enclosed behind glass for ease of accessibility.
3. Shrouds will include a minimum of two internal simplex receptacles for power.
4. Shrouds will allow for internal data terminations.
5. Monitors are not included.

E. End fillers for relocatable wall adjacent to fixed walls and columns shall be similar in construction to solid wall skins and fit into end channel on the abutting wall. End channels and Mini-ends will include a continuous light and sound seal.

F. End fillers may utilize solid skins that are field cut to narrower unit width as indicated on drawings. Cut skins will be manufactured in the same manner and with same materials as all other solid skins.

G. Skins glass frames and corresponding framing elements shall be manufactured in widths as indicated on shop drawings.

H. Solid skins and glass frames shall be mounted to structural frame by engaging an operable mechanical bracket that securely engages the framing components. The mechanical bracket will be designed to ensure that un-engaged brackets are easily identified.

I. The installation and removal of solid skins shall require a special tool to limit accessibility to authorized personnel and to ensure security.

J. Solid skins shall be removable for access to wall cavity to facilitate electrical installation and inspection.

K. Solid skins shall be interchangeable with glass frames of equal sizes, and vice versa.

L. Wall structure to accommodate integral lighting fixtures as provided by the relocatable wall manufacturer.

2.04 STRUCTURAL FRAMING COMPONENTS

A. Structural framing posts will include a threaded leveler for adjusting to floor variations

B. Ceiling track shall be one-piece continuous formed steel with continuous factory-installed resilient light and sound.

C. Primary structural components will be formed of 16 gauge steel.

D. Horizontal and vertical framing components will be joined with 11 gauge corner brackets.

E. Vertical structural framing components shall incorporate integral slotting for direct mounting of panel-hung components on either or both sides of the wall, including side-by-side mounting. Continuous seals will conceal all slots. Structural framing components shall allow for direct mounting of panel-hung furniture without the need for any additive, field installed components. Structural framing can accommodate the direct interface of overhead storage and shelving without the use of any additional adapter/transition brackets.

F. Slotting will allow for wall mounted components to be positioned vertically at 1” increments from 18” to 120” AFF.

G. The system shall allow for installation on hard surface, or carpeted flooring, without the use of mechanical fasteners (in non-seismic applications).

H. The system can be installed to the underside of suspended ceilings without the use of destructive fasteners, with a one-piece continuous steel ceiling track.

I. Structural framing elements will be factory prepared for all connections and joinery hardware, and pre-punched for cable management.

J. Structural posts will be factory punched to optimize all required segmentation configurations, so that posts are interchangeable and share common hole locations.

K. Framing components to include factory applied polypropylene gaskets to serve as light and sound seals between the relocatable wall and fixed architectural elements.

2.05 DOOR COMPONENTS

A. Butt hinge door frames shall be reversible, allowing the installer to change the door swing as part of the installation process.

B. Butt-Hinged door frames shall be formed steel and aluminum and shall include continuous resilient sound seal at side and top jambs. Frame shall be designed to provide vertical adjustment to compensate for floor and ceiling irregularities without the need to cut doors on site. Frames shall be mortised and reinforced for hardware as specified in section 08 71 00.

C. Wall manufacturer to provide offset hinges for planar alignment of door with corridor side of wall.

D. Reversible door frames and door leaves to be capable of receiving automatic door bottoms for improved sound control.

E. Slide Door Units shall include fascia, header and track, finished opening frame, and sliding door. Track Shall be aluminum. Roller assemblies will be steel, with high quality ball bearing wheels. Hardware assembly to include pneumatic braking mechanism.

F. Slide door frames and door leaves to be capable of receiving automatic door bottoms for improved sound control.

G. Slide door track will be fully supported by wall structure, without requiring additional structural support from other architectural elements.

H. Solid door leaves shall be 1-3/4" thick; available in wood particleboard core with factory finished medium density overlay face or veneer. Doors shall be pre-finished and pre-mortised for hardware specified in section 08 71 00.

I. Polished glass doors to be ½" thick tempered glass. Doors shall be prepared and pre-drilled for hardware.

J. Hardware shall be
   1. Furnished and installed by the relocatable wall manufacturer.

K. The following hardware is to be furnished and installed by the relocatable wall contractor:
   1. Steelcase offset hinges for reversible door frame
   2. Slide door track, hardware, door pull and lock

L. Cylinders and cores that are configured to specific master-key requirements will be provided and installed by others

2.06 GLAZED OPENING COMPONENTS

2

A. All glass frames to be flush glazed.

B. Captured glass frame assemblies shall accommodate single glazed or double glazed configurations. Single glazed assemblies shall be capable of retrofit to double glazed, and vice-versa.

C. The structural frame and glass frame configuration will allow for glass frames to be exchanged for solid skins and vice-versa, without having to alter the structural frame components.

D. Captured glass frames shall be pre-glazed prior to arriving at site.

E. All glass framing components will be constructed of extruded aluminum, either powder coat paint and/or clear anodized as called for in finish schedule.

F. All glass and glazing for relocatable walls shall be furnished under this section.

G. All unitized glass shall be factory installed using extruded non-PVC glazing strips. Foam tape or PVC glazing is not acceptable.

H. All glass shall comply with Federal Safety Standard for Architectural Glazing Materials (16 CFR, Part 1201).

I. Glass Types:
   1. Refer to Section 08 80 00, Glazing.

2.07 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Relocatable wall construction shall allow for field installation of modular and/or hard-wired electrical components.

B. If specified, modular power shall be furnished under this section and shall include:
   1. UL 183 4-circuit, 8-wire prefabricated/pre-wired power distribution system.
   2. The modular power system shall be comprised of power blocks, receptacles, power harnesses and infeeds.
   3. Modular power system shall be electrified by using either a floor infeed, top infeed, or power harness.
   4. The modular power block shall provide for the insertion of receptacles of either the same or different circuits.
   5. Modular power components will allow for modular electrical receptacles, such that the circuit assignment for any termination can be easily changed by exchanging modular receptacles.
   6. Modular power receptacles will include an acoustical back-box to minimize sound transmission at power cutouts and terminations.

2.08 LED LIGHTING COMPONENTS

A. LED light fixtures will be provided by the wall manufacturer to supplement general lighting in video conferencing rooms. Refer to plans for locations and switching requirements.

B. Fixtures shall be factory assembled and integrated into the wall structure to be flush to the surface of the wall.

C. Light fixtures will be interchangeable with solid skins of same sizes.

D. Light source to be 24V LED light strip.

E. Lighting to include transformer and LED dimming controller for dimming switch device.

F. Light Output Characteristics:
   1. Correlated Color
   2. Temperature: CCT 3,000 K +/- 250 per ANSI color bin
   3. Color Rendering Index: CRI 80 minimum
   4. Intensity (Surface Brightness): 1250 cd/m2 +/- 350 cd/m2

G. The following components will be provided and installed by others, see Division 26 - Electrical:
   1. Electrical enclosure for transformer & dimming controller
   2. Switches or other control devices and related wiring
   3. Final wiring and connections from light fixture to transformer.
   4. Final wiring and connections to building power source

2.09 MATERIALS

A. All metal painted panel surfaces, glass frames, doorframes, base trim and ceiling track will be cold-formed steel or extruded aluminum.

B. Where noted in drawings, aluminum will be extruded aluminum (6063-T6 Aluminum alloy) with a clear anodized finish.

C. All glass shall comply with Federal Safety Standard for Architectural Glazing Materials (16 CFR, Part 1201).

D. Light and sound seals to be polypropylene.

E. Finishes: Refer to Finish Schedule on Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that building conditions are ready to receive wall components and that field measurement dimensions are as indicated on shop drawings.

B. Verify that floor level does not vary by more than plus/minus ¾" from specified height.

C. Verify that ceiling level does not vary by more than plus/minus ¾" from specified height.

D. Verify that adjacent *surfaces do not exceed 1/8 inch in 8'-0" variation from plumb.*

E. Verify that floor flatness complies with the American Concrete Institute (ACI) floor flatness (FF) requirements per AC117 and ASTM E1155 for Moderately Flat floors (maximum of 3/8" gap over 90% of samples and 5/8" gap over 100%).

3.02 INSTALLATION

A. Walls shall be installed without permanent fastenings over finished floor tile, carpeting or raised floor to provide for complete flexibility of future changes without having to patch floor material (unless required for door/hardware operation, or to meet structural or code requirements).

B. Partition shall be scribed and neatly fitted to existing building conditions all in accordance with details approved on shop drawings

C. Installer to provide touch-up of all nicks and scratches that may occur to the wall during handling and installation with touch up paint supplied by the manufacturer in matching color.

D. Installation shall not commence until building is enclosed and finishing operations, including ceiling, floor-covering and painting, are complete.

3.03 CLEANING

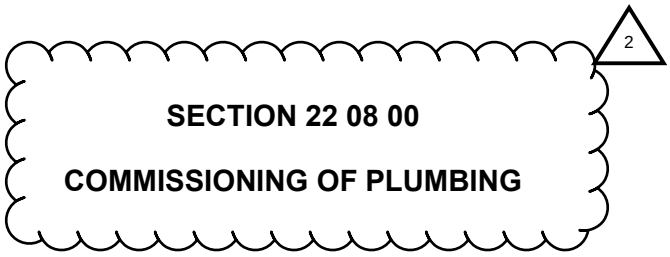
A. Upon completion of work, this contractor shall remove all of his cartons, trash, crates, etc. and leave the premises broom clean.

B. Washdown of walls shall not be part of this section, but shall be considered normal pre-occupancy cleaning responsibility of G.C., owner or occupant.

3.04 MAINTENANCE

A. It shall be the responsibility of the relocatable wall bidder to include in this proposal, the location of the nearest service facility established to service occupant changes of material requirements.

END OF SECTION



PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

A. Section includes commissioning process requirements for the following plumbing systems, assemblies, and equipment:
   1. Domestic hot- and cold-water piping.
   2. Plumbing pumps.
   3. Plumbing equipment.

B. Related Requirements:
   1. Section 019113 "General Commissioning Requirements" for general commissioning process requirements and Commissioning Coordinator responsibilities.

1.03 DEFINITIONS

A. Cx: Commissioning, as defined in Section 019113 "General Commissioning Requirements."

B. CxA: Commissioning Authority, as defined in Section 019113 "General Commissioning Requirements."

C. "Systems," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For plumbing testing technician.

B. Construction Checklists: See related Sections for technical requirements for the following construction checklists:
   1. Vibration and seismic controls for plumbing piping and equipment.
   2. Instrumentation and control for domestic hot water.
   3. Domestic water piping.
   4. Pumps, valves, and accessories.
   5. Water heaters.

C. Test Equipment and Instruments: For all test equipment and instruments to be used in conducting Cx tests by Contractor, provide the following:
   1. Equipment/instrument identification number.
   2. Planned Cx application or use.

3. Manufacturer, make, model, and serial number.
4. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
5. Equipment manufacturers' proprietary instrumentation and tools. For each instrument or tool, identify the following:
    a. Instrument or tool identification number.
    b. Equipment schedule designation of equipment for which the instrument or tool is required.
    c. Manufacturer, make, model, and serial number.
    d. Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

1.05 QUALITY ASSURANCE

A. Plumbing Testing Technician Qualifications: Technicians to perform plumbing construction checklist verification tests, construction checklist verification test demonstrations, commissioning tests, and commissioning test demonstrations shall have the following minimum qualifications:
    1. Journey level or equivalent skill level with knowledge of plumbing system, electrical concepts, and building operations.
    2. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.

B. Testing Equipment and Instrumentation Quality and Calibration: For test equipment and instrumentation required to perform plumbing commissioning work, perform the following:
    1. Capable of testing and measuring performance within the specified acceptance criteria.
    2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
    3. Be maintained in good repair and operating condition throughout duration of use on Project.
    4. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.

C. Proprietary Test Instrumentation and Tools:
    1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the commissioning process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, perform the following:
        a. Be calibrated by manufacturer with current calibration tags permanently affixed.
        b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
        c. Plumbing system proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL TESTING REQUIREMENTS

A. Certify that plumbing systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents and approved Shop Drawings and submittals.

B. Certify that plumbing instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved Shop Drawings and submittals, and that pretest set points have been recorded.

C. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

D. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions to verify compliance with acceptance criteria.

E. Test systems, assemblies, subsystems, equipment, and components operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and response according to acceptance criteria.

F. Construction Checklists: Prepare and submit detailed construction checklists for plumbing systems, subsystems, equipment, and components.
   1. Contributors to the development of construction checklists shall include, but are not limited to, the following:
      a. Plumbing systems and equipment installers.
      b. Plumbing instrumentation and controls installers.

G. Perform tests using design conditions, whenever possible.
   1. Simulated conditions may, with approval of Architect, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by Commissioning Coordinator and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
   2. Commissioning test procedures may direct that set points be altered when simulating conditions is impractical.
   3. Commissioning test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.

H. If tests cannot be completed because of a deficiency outside the scope of the plumbing system, document the deficiency and report it to Owner. After deficiencies are resolved, reschedule tests.

I. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.

J. Coordinate schedule with, and perform the following activities at the direction of, Commissioning Coordinator.

K. Comply with construction checklist requirements, including material verification, installation checks, start-up, and performance tests requirements specified in Sections specifying plumbing systems and equipment.

L. Provide technicians, instrumentation, tools, and equipment to complete and document the following:
   1. Performance tests.
   2. Demonstration of a sample of performance tests.
   3. Commissioning tests.
   4. Commissioning test demonstrations.

END OF SECTION

SECTION 22 11 23

DOMESTIC WATER PUMPS

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. In-line, sealless centrifugal pumps.

1.03 DEFINITIONS

A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include materials of construction, rated capacities, certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. LEED Submittals:
   1. Product Data for Prerequisite EA 2: Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, without amendments, Section 7 - "Service Water Heating."

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water pumps to include in operation and maintenance manuals.

1.06 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. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with pump manufacturer's written rigging instructions for handling.

1.08 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.01 IN-LINE, SEALLESS CENTRIFUGAL PUMPS

A. Manufacturers: Subject to compliance with requirements, products by one of the following:
1. Armstrong Pumps, Inc.
2. Bell & Gossett; a Xylem brand.
3. Grundfos Pumps Corp. (Model No. UPS-26-99-BUAC/T)

2

B. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps.

C. Pump Construction:
1. Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal.
2. Casing: Bronze, with threaded or companion-flange connections.
3. Impeller: Corrosion-resistant, Composite, PES.
4. Motor: Integrated Variable Speed Drive.

D. Capacities and Characteristics:
1. Capacity: Refer to drawings. Built-in timer.

2.02 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 22 05 13 "Common Motor Requirements for Plumbing 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.

2.03 CONTROLS

A. Aquastat: Field adjustable for control of hot water circulating pump.
1. Description: Thermostatic switch.
2. Type: Bi-metallic disc, snap acting.
3. Enclosure: Environmentally sealed.
4. Mounting: Clip-on mount for ¾" copper tube.
5. Similar to Grundfos No. 595657.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in of domestic-water-piping system to verify actual locations of connections before pump installation.

3.02 PUMP INSTALLATION

A. Comply with HI 1.4.

B. Install in-line, sealless centrifugal pumps with shaft horizontal unless otherwise indicated.

C. Install horizontal mounted, in-line, separately-coupled and close-coupled centrifugal pumps with shaft(s) horizontal.

D. Pump Mounting: Install vertically mounted, in-line, close-coupled centrifugal pumps with cast-iron base mounted on concrete base using elastomeric pads restrained spring isolators.
   1. 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.
   2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
   3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   4. Install anchor bolts to elevations required for proper attachment to supported equipment.
   5. Comply with requirements for hangers and supports specified in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."

E. Install thermostats in hot-water return piping.

3.03 CONNECTIONS

A. Comply with requirements for piping specified in Section 22 11 16 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to pumps to allow service and maintenance.

C. Connect domestic water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.
   1. Install flexible connectors adjacent to pumps in suction and discharge piping of the following pumps:
      a. Horizontal mounted, in-line, close-coupled centrifugal pumps.
      b. Comply with requirements for flexible connectors specified in Section 22 11 16 "Domestic Water Piping."

D. Install shutoff valve and strainer on suction side of each pump, and check, shutoff, and throttling valves on discharge side of each pump. Install valves same size as

connected piping. Comply with requirements for valves specified in Section 22 05 23.12 "Ball Valves for Plumbing Piping," Section 22 05 23.13 "Butterfly Valves for Plumbing Piping," Section 22 05 23.14 "Check Valves for Plumbing Piping," and Section 22 05 23.15 "Gate Valves for Plumbing Piping," and comply with requirements for strainers specified in Section 22 11 19 "Domestic Water Piping Specialties."

1. Install pressure gage and snubber at suction of each pump and pressure gage and snubber at discharge of each pump. Install at integral pressure-gage tappings where provided or install pressure-gage connectors in suction and discharge piping around pumps. Comply with requirements for pressure gages and snubbers specified in Section 22 05 19 "Meters and Gages for Plumbing Piping."

E. Connect aquastat to hot water return pumps that they control.

3.04 IDENTIFICATION

A. Comply with requirements for identification specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment" for identification of pumps.

3.05 STARTUP SERVICE

A. Perform startup service.
1. Complete installation and startup checks according to manufacturer's written instructions.
2. Check piping connections for tightness.
3. Clean strainers on suction piping.
4. Set aquastat and timer for automatic starting and stopping operation of hot water return pumps.
5. Perform the following startup checks for each pump before starting:
   a. Verify bearing lubrication.
   b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
   c. Verify that pump is rotating in the correct direction.
6. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
7. Start motor.
8. Open discharge valve slowly.
9. Adjust temperature settings on thermostats.
10. Adjust timer settings.

3.06 ADJUSTING

A. Adjust domestic water pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust initial temperature set points.

C. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION

SECTION 23 31 13

HVAC METAL DUCTS

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. Ducts and fittings.
2. Sheet metal materials.
3. Flexible Ducts.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.
7. Seismic-restraint devices.
8. Duct leakage testing.

B. Related Sections:
1. Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 23 07 13 “HVAC Duct Insulation”.
3. Section 23 33 00 "Air Duct Accessories" for dampers, duct silencers, duct-mounting access doors and panels, turning vanes, and flexible connections.
4. Section 23 31 19 "HVAC Casings" for factory- and field-fabricated casings for mechanical equipment.

1.03 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design:
1. Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
2. Contractor may change duct sizes from those shown provided pressure drop and velocity remain constant. Duct aspect ratio shall be maximum 3:1 unless approved by owner’s representative.

B. 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", ASCE/SEI 7, and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
   1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
   2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
   3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of the following products:
   1. Flexible ducts.
   2. Liners and adhesives.
   3. Sealants and gaskets.
   4. [[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 details and spacing.
   8. Seam and joint construction and sealing.
   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, flexible connectors, and access doors and panels.
   12. Hangers and supports, including methods for duct and building attachment and vibration isolation.

C. Delegated-Design Submittal:
   1. Sheet metal thicknesses.
   2. Joint and seam construction and sealing.
   3. Reinforcement details and spacing.
   4. Materials, fabrication, assembly, and spacing of hangers and supports.
   5. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation] for selecting hangers and supports [and seismic restraints].

D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK) – HVAC Air Duct Leakage Test Manual.

1.05 INFORMATIONAL SUBMITTALS

A. Welding certificates.
B. Field quality-control reports.

1.06 QUALITY ASSURANCE

A. 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 D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
   3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
D. REGULATORY REQUIREMENTS
   1. Construct ductwork to NFPA 90A standards.

E. FIELD CONDITIONS
   1. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
   2. Maintain temperatures within acceptable range during and after installation of duct sealants.
   3. Ductwork shall be transported to the site in enclosed vehicles or with ends capped.
   4. Do not store ductwork directly on ground or floor.
   5. Ductwork stored or stacked on site shall be capped.
   6. Installed duct shall be capped at the end of the day. Duct found uncapped after the end of the day shall be cleaned.

PART 2 - PRODUCTS

2.01 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.
   1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
   2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Transverse Joints: Prefabricated slide on joints or formed-on flanges fabricated according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," 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."

a. Slide on Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.

b. Formed on Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.

2. Manufacturers
   a. Ductmate Industries, Inc.
   b. Lockformer.
   c. Nexus Inc.
   d. Ward Industries

C. Longitudinal Seams: Pittsburgh lock seams fabricated according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," 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.
   2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

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."

E. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359-inch thick or less, with more than 10 sq ft of non-braced panel area unless ducts are lined.

2.02 SINGLE-WALL ROUNDDUCTS 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.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. 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."

D. Duct Joints
   1. Ducts up to 20 Inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.
   2. Ducts 21 to 60 Inches in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.
   3. Ducts Larger than 60 Inches in Diameter: Companion angle flanged joints per SMACNA "HVAC Duct Construction Standards--Metal and Flexible," Figure 3-2.
   4. Round Ducts: Prefabricated connection system consisting of double-lipped, EPDM rub-ber gasket. Manufacture ducts according to connection system manufacturer's tolerances.
      a. Manufacturers
         1) Ductmate Industries, Inc.
         2) Lindab Inc.

E. 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 less than 84 inches diameter with spiral lockseam.
   2. Fabricate round ducts larger than 84 inches in diameter with butt-welded longitudinal seams.
   3. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

F. 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." 90 degree T’s without shoe and pulled fittings are not permitted.

G. Fabricate elbows using die-formed, gored spot welded and sealed, or pleated construction. Unless elbow construction type is indicated, fabricate elbows as follows:
   1. Round Elbows 8 Inches and Less in Diameter: 2-piece welded construction, fabricate die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate non-standard bend-angle configurations or nonstandard diameter elbows with gored construction.
   2. Round Elbows 9 through 14 Inches in Diameter: Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees. Fabricate non-standard bend-angle configurations or nonstandard diameter elbows with gored construction.
   3. Round Elbows Larger than 14 Inches in Diameter and All Flat-Oval Elbows: Fabricate gored elbows.

2.03 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 (except as noted below): G60 (Z180).
   2. Galvanized Coating Designation for outside air intake ductwork, outdoor unjacketed ductwork, and as otherwise noted: G90 (Z275).
   3. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. PVC-Coated, Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
   1. Galvanized Coating Designation: G60 (Z180).
   2. Minimum Thickness for Factory-Applied PVC Coating: 4 mils (0.10 mm) thick on sheet metal surface of ducts and fittings exposed to corrosive conditions, and minimum 1 mil (0.025 mm) thick on opposite surface].
   3. Coating Materials: Acceptable to authorities having jurisdiction for use on ducts listed and labeled by an NRTL for compliance with UL 181, Class 1.

D. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

E. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M) Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

F. Factory- or Shop-Applied Antimicrobial Coating:
   1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.
   2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
   3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested according to ASTM D 3363.
   4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
   5. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.

G. 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.

H. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

I. Duct Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during transportation and construction.
   1. Product: DynAir Duct Protection Film or equivalent.
   2. High tack water-based adhesive.
   3. Thickness: 2 mils.
   4. UV stability.
   5. VOC content: zero.
   6. Elongation before break: minimum 325 %.

2.04 DUCT LINER

A. General Requirements:
   1. No fiberglass duct liner is allowed.
   2. Service temperature: -20 deg F to 250 deg F.
   3. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
   4. NFPA 90A and NFPA 90B compliant.
   5. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
   6. Passes ASTM C665 and C1338 for fungi resistance and mold growth.

B. Polyester Duct Liner:
   1. Manufacturers:
      a. Ductmate - PolyArmor.
      b. Or engineer-approved equivalent.
   2. K value: ASTM C518, 0.24 at 75 deg F; R-value per inch: 4.2.
   3. Minimum Noise Reduction Coefficient (NRC): 0.65 at 1 inch thickness.
   4. Maximum moisture sorption: 2% by weight.
   5. Minimum 25% recycled content.
   6. Volatile Organic Content (VOC): 0 ppm.
   7. Water-Based Liner Adhesive.

C. Polyamide Foam Duct Liner:
   1. Manufacturers:
      a. Boyd Corporation – Solcoustic.
      b. Or engineer-approved equivalent.
   2. K value: ASTM C518, 0.30 at 75 deg F; R-value per inch: 3.3.
   3. Minimum Noise Reduction Coefficient (NRC): 0.70 at 1 inch thickness.
   4. Maximum moisture sorption: 2% by weight.
   5. Mechanical Fasteners:
      a. Suitable for attachment to duct without damaging liner as recommended by manufacturer.
      b. Pin length: as required. Pin shall project no more than 1/8 inch (3 mm) into air stream.

D. 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- (2.6-mm-) diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

2.05 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 (ASTM E84); certified by an NRTL.
B. Water-Based Joint and Seam Sealant:
   1. Application Method: Brush on or spray on.
   2. Solids Content: Minimum 65 percent.
   3. Shore A Hardness: Minimum 20.
   4. Water resistant.
   5. Mold and mildew resistant.
   6. Volatile Organic Content (VOC): Maximum 75 g/L (less water).
   7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
   8. Service: Indoor or outdoor.
   9. Substrate: Compatible with galvanized sheet steel, stainless steel, or aluminum sheets.

C. Flanged Joint Sealant: Single-component, acid-curing, silicone, elastomeric. Comply with ASTM C 920, Type S, Grade NS, Class 25, Use O.
   1. 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).
   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."

D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

E. 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 for10-inch wg static-pressure class, positive or negative.

2.06 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
F. 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.
G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:
1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.07 SEISMIC-RESTRAINT DEVICES

A. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
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.

B. 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.
C. 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.
1. Basis of Design: Mason SCB.

D. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
E. 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

3.01 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 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 at least 1 inch (25 mm), 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 (38 mm).
K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 23 33 00 "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."
M. Under no circumstances will any labels be permitted on interior surfaces of ductwork. Any materials delivered to the jobsite with interior labels shall be physically and chemically cleaned to remove all remnants of the tag and/or adhesive used to place it.
N. Where connecting flexible duct to metal duct the inner lining shall be placed a minimum of 6 inches over the metal. A zip tie shall be placed over the joint and the flexible duct collar attached with a minimum of three sheet metal screws with foil tape provided to seal the end. The duct insulation shall cover this assembly with the outer membrane covering the insulation and sealed with tape having an integral vapor barrier.
O. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
P. Duct Tape is not permitted.
Q. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
R. Aluminum ductwork shall be used to handle moisture-laden air from shower rooms, shower drying rooms. Slope duct up at minimum 1% slope away from exhaust grille for minimum of 10 feet.
S. At exterior wall louvers, seal duct to louver frame. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Insulate unused portion of outside air intake or exhaust louvers, and duct to the insulated isolation damper. Blank-out material shall be same material as duct, painted black on exterior side. Install outside air intakes to pitch (1 inch per 20 feet) toward intake louver where possible, provide a low point drain prior to equipment where intake duct must slope down from louver. Seal ducts seams to form watertight joints.

T. Install minimum 10 feet of stainless steel duct after all duct mounted humidifiers with botoom surface sloped back at 1% to humidifier.

3.02 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts 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. Comply with ASTM A780.

3.03 ADDITIONAL EXTERIOR DUCT INSTALLATION REQUIREMENTS

A. Exterior ductwork under negative pressure shall be so designed and constructed that rainwater on the duct surface cannot be drawn into the duct to reappear inside the building.

B. Exterior ductwork under positive pressure is to be made watertight with exterior waterproof sealant.

C. The cross section of all exterior ductwork shall be pitched at 1 percent slope such that water drains from the top of the duct to one or both sides of the duct, and does not pool on the top.

D. Paint exposed roof mounted ductwork; color to be per Architect requirements.

3.04 ADDITIONAL WELDED DUCT REQUIREMENTS

A. All welded duct may be butt-welded or joggle welded. Where joggle welds are used on fume exhaust systems, the lip formed on the interior surface shall be oriented downstream of the airflow to minimize pockets where condensed liquids may collect.
B. Welded duct sections shall be verified to be continuous and free of leakage prior to shipment from the fabrication facility. Leakage testing may be accomplished utilizing either light or pressurization.
C. Welds on exposed ductwork in occupied spaces shall be prepared as follows:
   1. Stainless Steel #2B: Standard stainless steel finish used for ductwork, exhaust stacks, within mechanical spaces, low wall returns, fume hoods, back of house systems, etc. Welds shall be brushed and painted with Chrome Aluminum paint.

2. Stainless Steel #4: Exposed aesthetic architectural finish. Only shall be used when specified on drawings or elsewhere in the specifications. Finish shall be prepared to a kitchen grade finish with welds ground smooth and brush polished to restore the #4 finish.

D. For installations serving fume exhaust.
1. All fittings shall be long radius. Round elbows shall be minimum 5 gore.
2. Slope horizontal ductwork back toward source connected equipment minimum 1% slope so that moisture and liquids may drain back toward equipment.
3. Low point “traps” in the ductwork shall be fitted with a low point drain valve, ½” welded connection, stainless steel piping and valve.

3.05 ADDITIONAL REQUIREMENTS FOR CLOTHES DRYER EXHAUST DUCT

A. Duct shall not be routed through plenum or unconditioned attic or crawlspace.

B. Flexible dryer duct shall not be concealed.

3.06 ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL KITCHEN HOOD EXHAUST DUCT

A. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood for horizontal runs less than 75 feet. Duct shall be sloped at 1-inch per 12 inches for horizontal runs in excess of

B. Install fire-rated access panel assemblies at each change in direction and at maximum intervals of, 20 feet (6 m) where installed access doors are 20 inches x 20 inches and 12 feet (3.7 m) where access doors are less than 20 inches x 20 inches, in horizontal ducts, and at every floor for vertical ducts, or as indicated on Drawings.

C. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.
D. Install residue trap at the base of each vertical riser.

3.07 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."

3.08 INTERNAL LINING IINSTALLATION

A. 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.

3.09 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 (Table 5-1M), "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.

3.10 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." ASCE/SEI 7.
   1. Space lateral supports a maximum of 40 feet on.center, and longitudinal supports a maximum of 80 feet on center.
   2. Brace a change of direction longer than 12 feet.

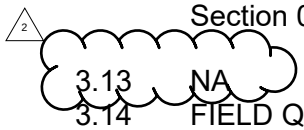
B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
C. Install cables so they do not bend across edges of adjacent equipment or building structure.
D. Install cable restraints on ducts that are suspended with vibration isolators.
E. Install seismic-restraint devices using methods approved by the Office of Statewide Health Planning and Development for the State of California or an agency acceptable to authorities having jurisdiction.
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.

3.11 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 23 33 00 "Air Duct Accessories."
B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.12 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 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting.".



3.13 NA

3.14 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 of positive 3-Inch wg or higher or negative 3-Inch wg or lower: Test 100 percent of total installed duct area for each designated pressure class.
      b. Ducts with a Pressure Class between positive 2-Inch wg and negative 2-Inch wg inclusive: Test representative duct sections, selected by Design Engineer, totaling no less than 25 percent of total installed duct area for each designated pressure class.
      c. Risers and all supply and exhaust branch ducting shall be tested to within 5 feet of a diffuser collar or the point of connection to an exhaust device, respectively.
      d. Welded Exhaust Ducts: Test 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.

3.15 DUCT SCHEDULE

A. Fabricate ducts of galvanized steel except as otherwise indicated and as follows:

Table: Duct Schedule

Type	Material	Pressure Class	Rect. Leakage Class	Round Leakage Class	Seal Class
Supply Risers/Mains	Galvanized	+ 4" w.g.	6	3	A
Supply (after fan coil units, heat pumps)	Galvanized	+ 2" w.g.	24	12	C
Constant volume AHU Supply (Risers and Mains)	Galvanized	+ 3" w.g.	6	3	A
Return	Galvanized	- 2” w.g.	24	12	C
Transfer	Galvanized	- 1” w.g.	24	12	C
Outside Air	Galvanized	- 2” w.g.	24	12	C
General Exhaust	Galvanized	- 2" w.g.	12	6	B

Notes:

1. All supply, return, relief and exhaust duct utilized as part of a smoke exhaust, stair and elevator pressurization system pressure class shall be 1.5 times that stated above or maximum scheduled fan design pressure whichever is greater.

B. Liner:
   1. Supply Air Ducts: Polyester, 1 inch (25 mm) thick.
   2. Return Air Ducts: Polyester, 1 inch (25 mm) thick.
   3. Exhaust Air Ducts: Polyamide, 1 inch (25 mm) thick.
   4. Supply Fan Plenums: Polyamide, 2 inches (51 mm) thick.
   5. Return- and Exhaust-Fan Plenums: Polyamide, 2 inches (51 mm) thick.
   6. Transfer Ducts: Polyamide, 1 inch (25 mm) thick.

C. 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 (5 m/s) 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 (5 to 7.6 m/s):
   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 (7.6 m/s) 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.
   b. Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
   c. Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
   d. Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
   e. Radius-to Diameter Ratio: 1.5.
   f. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
   g. Round Elbows,14 Inches and Larger in Diameter: Standing seam.

D. 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

SECTION 23 33 00

HVAC DUCT ACCESSORIES

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. Backdraft dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Pressure Independent Automatic Balancing Dampers
5. Fire dampers.
6. Smoke dampers.
7. Combination fire and smoke dampers.
8. Corridor dampers.
9. Duct silencers.
10. Turning vanes.
11. Remote damper operators.
12. Duct-mounted access doors.
13. Flexible connectors.
14. Duct security bars.
15. Duct accessory hardware.

B. Related Requirements:
1. Division 07 for Firestopping.
2. Section 23 31 13 “HVAC Metal Ducts” for flexible ducts.
3. Division 26 for wiring connections.

1.03 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.

2

B. REMOVED.

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.

1.04 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.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.06 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. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

1.07 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
B. Sound Attenuators
1. All tests shall be conducted by a laboratory that is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) to conduct the test. A copy of the accreditation certificate must be included with the submittals. Data from non-NVLAP accredited test facilities will not be accepted. Where test data is obtained in the manufacturer's laboratory, the facility shall be available for inspection and witnessed testing by the architect, mechanical engineer and acoustical consultant in order to verify compliance with the latest edition of ASTM Standard E477 or a test standard approved by the acoustical consultant. The architect or project acoustical consultant shall be the final arbiter in determining compliance.
2. Manufacturer’s Experience: The manufacturer shall have successful experience in duct silencer production, including no less than five years experience in fabrication and delivery of duct silencers equal in size and quantity to this work. The Manufacturer shall be capable of supplying references and acoustical test results for up to five recently completed projects similar to this work.
3. Acoustical and Aerodynamic Performance: Duct silencer acoustical and aerodynamic performance shall be determined in accordance with the latest edition of ASTM Standard E477-90 Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers or a test standard

approved by the acoustical consultant. All silencer ratings shall be determined in a duct-to-reverberant room test facility that provides for airflow in both directions through the test silencer in accordance with the latest edition of ASTM E-477 test standard or a test standard approved by the acoustical consultant. The test set-up, procedure and facility shall eliminate all effects due to flanking, directivity, end reflection, standing waves and reverberation room absorption.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

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.

C. Provide duct accessories of materials suited to associated duct materials.

D. Air extractors shall not be used, except with the expressed written consent of the Design Engineer.

2.02 BACKDRAFT DAMPERS

A. General:
1. Provide manufacturer’s standard backdraft damper if available as fan or air-moving equipment accessory.
2. Provide damper material of the same material as associated ductwork.

B. Manufacturers:
1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.

C. Description: Gravity balanced.
1. Maximum Air Velocity: 3000 fpm.
2. Maximum System Pressure: match associated ductwork.
3. Frame: hat shaped, minimum 20 gage galvanized steel,flanged both sides.
4. Bearings: Synthetic.
5. Blades: Multiple single-piece parallel blades, minimum 28 gage galvanized steel.
6. Blade Seals: Extruded vinyl, mechanically locked.
7. Linkage: concealed in frame
8. Blade Axles:
    a. Up to 42 inch damper width: Nonmetallic or steel
    b. 42 inch width and larger: steel.
9. Tie Bars and Brackets: Galvanized steel.
10. Accessories:
    a. Adjustment device to permit setting for varying differential static pressure.
    b. Counterweights and spring-assist kits for vertical airflo

c. Electric actuators.
d. Chain pulls.
e. Screen Mounting: Front mounted in sleeve.
   1) Sleeve Thickness: 20 gage minimum.
   2) Sleeve Length: 6 inches minimum.
f. Screen Mounting: Rear mounted.
g. Screen Material: Galvanized steel.
h. Screen Type: **Bird**.
i. 90-degree stops.

2.03 BAROMETRIC RELIEF DAMPERS

A. Description: Counterbalanced backdraft damper.
1. Sensitivity: 0.01 inch w.g. differential pressure.
2. Frame : extruded aluminum channel, front and rear flanges.
3. Blades: Single-piece, parallel, minimum 28 gage aluminum
4. Blade Seals: Extruded vinyl, mechanically locked maximum 6” width.
5. Bearings: Synthetic
6. Counterbalance: zinc plated adjustable steel weights attached to blades.
7. Accessories:
   a. Screen Mounting: Front mounted in sleeve.
      1) Sleeve Thickness: 20 gage minimum.
      2) Sleeve Length: 6 inches minimum.
   b. Screen Mounting: Rear mounted.
   c. Screen Material: Galvanized steel.
   d. Screen Type: **Bird**.

2.04 MANUAL VOLUME DAMPERS

A. General Description: Factory fabricated, with required hardware and accessories.

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

C. Damper Frame: hat-shaped, material shall match associated ductwork.

D. Flanges for attaching to walls and flangeless frames for installing in ducts.

E. Manufacturers:
1. Ruskin.
2. Louvers and Dampers.
3. Nailor Industries.

F. Standard Manual Volume Dampers (2-inch wg and below):
1. Frame: 3 inch deep, minimum 20 gauge galvanized steel.
2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Maximum Air Velocity: 1500 fpm.
5. Maximum System Pressure: 2 inch w.g.
6. Axles:

a. 18” wide and below: minimum 3/8” square extended beyond frame with standoff bracket.
b. 19” wide and above: minimum 1/2” square extended beyond frame with standoff bracket.
c.

7. Blades:
   a. Stiffened, opposed-blade design.
   b. 18” wide and below: 22 gauge.
   c. 19” wide and above: 16 gauge.
   d. [Include locking hand quadrant to hold single-blade dampers in a fixed position without vibration.]
8. Bearings: Molded synthetic.

G. Standard Manual Volume Dampers 3-inch wg and above):
1. Frame: 5-inch deep, minimum 16 gage reinforced for corner braces.
2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Maximum Air Velocity: 1500 fpm.
5. Maximum System Pressure: 5 inch w.g.
6. Axles: minimum 1/2”
7. Control shaft: minimum 1/2” square extended beyond frame with standoff bracket, with outboard support bearing.
8. Blades:
   a. Opposed-blade design.
   b. Minimum 16 gage
   c. Stiffen damper blades for stability.
   d. Blade stop.
   e. [Include locking hand quadrant to hold single-blade dampers in a fixed position without vibration.]
9. Bearings: Molded synthetic.

H. Low-Leakage, Steel, Manual Volume Dampers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Pottorff.
   b. Ruskin Company.
   c. Trox USA Inc.
2. Comply with AMCA 500-D testing for damper rating.
3. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
4. Suitable for horizontal or vertical applications.
5. Frames:
   a. Hat or U shaped.
   b. 0.094-inch- (2.4-mm-) thick, galvanized sheet steel.
   c. Mitered and welded corners.
   d. Flanges for attaching to walls and flangeless frames for installing in ducts.
6. Blades:
   a. Multiple or single Airfoil blade.
   b. Opposed-blade design.
   c. Stiffen damper blades for stability.
   d. Galvanized, roll-formed steel, 0.064 inch thick.

7. Blade Axles: Galvanized steel.
8. 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.
9. Blade Seals: Neoprene.
10. Jamb Seals: Cambered stainless steel.
11. Tie Bars and Brackets: Galvanized steel.
12. Accessories:
    a. Include locking device to hold single-blade dampers in a fixed position without vibration.

2.05 FIRE AND SMOKE DAMPERS

A. Manufacturers:
1. Ruskin Company.
2. Louvers & Dampers, Inc.
3. Nailor Industries, Inc.
4. Ward Industries.

B. General Requirements:
1. Labeled according to UL 555C by an NRTL.
2. Fabricate in accordance with NFPA 90A
3. Comply with construction details for tested assemblies as indicated in UL's "Fire Resistance Directory."
4. Fire Rating: to suit wall, floor, ceiling, or corridor assembly, refer to Architectural Drawings.
5. Operational ratings: suited to meet duct pressure and velocity design airflow conditions.
6.

C. Fire Dampers:
1. Type: Dynamic.
2. Operational ratings: suited to meet design airflow conditions, and minimum 4-inch wg static pressure class and 2000-fpm velocity.
3. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, galvanized steel; with mitered and interlocking corners.
4. Blades: Roll-formed, interlocking, airfoil, galvanized sheet steel.
5. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
6. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.
7. links.

D. Smoke Dampers:
1. Smoke Detector: . Refer to Specification section 28 31 11 “DIGITAL ADDRESSABLE FIRE ALARM”
2.]Operational ratings: suited to meet design airflow conditions, and minimum 4-inch wg static pressure class and 2000-fpm velocity.
3. Frame: hat shaped, galvanized sheet steel with mounting frame.
4. Blades: Airfoil, galvanized sheet steel.
5. Leakage: Class I.

6. Actuator: electric, out of airstream, two-position, fail closed.
7. Mounting Sleeve: Factory-installed, with breakaway connection galvanized sheet steel; length to suit wall or floor application. Gage shall be per requirements of UL 555 and not less than the attached duct gage, with factory-furnished silicone calking
   The following options are not required by code however, they do provide functionality for the mandatory cycle testing of dampers as required by NFPA. The switch package allows for remote operation and visual indication of the damper status and is typically mounted under the ceiling. Typically this would only be used in industrial applications because of the visual impact of the lights and panel. The damper test switch is typically duct mounted and performs same function to locally cycle test the damper. We should include one of these options unless building contains full smoke control with firemans control panel as all dampers can be tested through that.
8. Switch Package to allow remote indication of damper blade position.
9. Damper test switch for cycle testing.
10. [Auxilary switch for fan signaling for fan shut down where failure of damper would block greater than than 50% of fan airflow.

E. Combination Fire and Smoke Dampers:
1. Operational ratings: suited to meet design airflow conditions, and minimum 4-inch wg (1 kPa) static pressure class and 2000-fpm (10 m/s) velocity.
2. Frame: hat shaped, galvanized sheet steel.
3. Heat-Responsive Device: Electric resettable link and switch package, factory installed, rated.
4. Smoke Detector: **Refer to Specification section 28 31 11 "DIGITAL ADDRESSABLE FIRE ALARM"**Blades: Roll-formed, one-piece airfoil, galvanized sheet steel.
5. Actuator: electric, out of airstream, two-position, fail closed.
6. Leakage: Class I.
7. Mounting Sleeve: Factory-installed, with breakaway connection galvanized sheet steel; length to suit wall or floor application. Gage shall be per requirements of UL 555 and not less than the attached duct gage, with factory-furnished silicone calking.
8. Damper test switch for cycle testing.
9. Auxilary switch for fan signaling for fan shut down where failure of damper would block greater than than 50% of fan airflow.

F. Corridor Dampers:
1. Operational ratings: suited to meet design airflow conditions, and minimum 4-inch wg static pressure class and 2000-fpm velocity.
2. Frame: hat shaped, galvanized sheet steel.
3. Heat-Responsive Device: Electric resettable link and switch package, factory installed, rated.
4. Smoke Detector: **Refer to Specification section 28 31 11 "DIGITAL ADDRESSABLE FIRE ALARM"**Blades: Roll-formed, one-piece airfoil, galvanized sheet steel.
5. Mounting Sleeve: Factory-installed, with breakaway connection galvanized sheet steel; length to suit wall or floor application. Gage shall be per requirements of UL 555 and not less than the attached duct gage, with factory-furnished silicone calking.
6. Leakage: Class I.

2.06 DUCT SILENCERS

A. Manufacturers:
1. Vibro-Acoustics.
2. Ruskin.
3. Kinetics Noise Control.

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.
4. All casing seams and joints shall be lock-formed and sealed or stitch welded and sealed to provide leakage-resistant construction. Airtight construction shall be achieved by use of a duct-sealing compound supplied and installed by the contractor at the jobsite.

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.
6. Rectangular Packless

D. Rectangular Silencer Outer Casing: ASTM A 653/A 653M, G90 (Z275), galvanized sheet steel,
1. Sheet Metal Thickness for straight units 0.034 inch thick.
2. Sheet Metal Thickness for elbow units 0.060 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 (0.85 mm) 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 (Z275) galvanized sheet metal
1. Sheet Metal Thickness for straight units 0.018 inch thick
2. Sheet Metal Thickness for elbow units 0.030 inch thick.
3. Sheet Metal Thickness for circular units through 18 inches 0.018 inch thick
4. Sheet Metal Thickness for circular units above 18 inches 0.030 inch thick

G. Special Construction:
1. Suitable for outdoor use.
2. High transmission loss walls

H. Connection Sizes: Provide transition to and from connecting ductwork to schedule silencer size.

I. Principal Sound-Absorbing Mechanism:
1. Controlled impedance membranes and broadly tuned resonators without absorptive media.
2. Dissipative 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.
    c. Glass fiber and fiber glass will not be permitted.

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.

L. Source Quality Control: Test according to ASTM E 477.

2.07 TURNING VANES

A. Manufacturers:
1. Duro Dyne Inc.
2. Ductmate Industries.
3. Metalaire.
4. Ruskin.

B. 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."

C. 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. Single Wall: 3/4 inch trailing edge and 2 inch radius.
2. Double Wall: 2 inch inside radius. Vane length not to exceed 36 inch.
3. Acoustic Turning Vanes: 4 inch double wall airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

E. 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.

2.08 REMOTE CABLE-DRIVEN VOLUME DAMPER OPERATORS

A. Manufacturers:
1. Pottorff.
2. Ventfabrics, Inc.
3. Ventlok.
4. Young Regulator Company.

B. Description: Cable system designed for remote manual damper adjustment.
1. Provide package for complete workable system for remote damper operation.
2. Pressure Rating: 1-inch w.g.
3. Velocity Rating: 1,500 FPM.
4. Tubing: Plastic.
5. Cable: Stainless steel, 50 feet maximum length.
6. Wall-Box Mounting:
    a. Recessed, with tamper-proof, stainless steel cover plate.

2.09 DUCT-MOUNTED ACCESS DOORS

A. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2 (7-2M), "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."
1. Door:
    a. Double wall; insulation fill and thickness as indicated for duct pressure class, minimum 1 inch.
    b. Hinges and Latches: continuous piano hinge and cam latches.
    c. Shape and material to match ductwork.
    d. Fabricate doors airtight and suitable for duct pressure class.
    e. Doors shall open against air pressure.
    f. On access doors on ducts of 4 inch w.g. pressure or greater, provide sign reading “CAUTION – DOOR CLOSES WITH AIR PRESSURE”.
2. Frame duct opening with continuous 1 inch by 1 inch angle. Provide sponge rubber or neoprene gasket at door-to-frame and frame-to-duct.

B. Pressure Relief Access Door:
1. Door and Frame Material: Galvanized sheet steel.
2. Door: Single wall for non-insulated ducts [**Double wall with insulation fill**] for insulated ducts 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 at 1.0- to 5.0-inch wg.
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- (25-mm-) thick, polystyrene-foam board.

2.10 DUCT ACCESS PANEL ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. 3M.
2. CL WARD & Family Inc.
3. Ductmate Industries, Inc.
4. Flame Gard, Inc.

B. Labeled according to UL 1978 by an NRTL.

C. Panel and Frame: Minimum thickness 0.0528-inch carbon steel.

D. Fasteners: Stainless 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.

2.11 FLEXIBLE DUCTS

A. Noninsulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire.
   1. Manufacturers:
      a. Casco L-181M.
      b. Flexmaster USA 1NI.
      c. Thermaflex MC.
   2. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg negative.
   3. Maximum Air Velocity: 4000 fpm .
   4. Temperature Range: Minus 10 to plus 160 deg F .
   5. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
   6. NFPA 90A and NFPA 90B compliant.

B. Acoustically Rated, Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; vapor-barrier film.
   1. Manufacturers:
      a. Casco SF-181M.
      b. Flexmaster USA 1B.
      c. Thermaflex M-KE.
   2. Pressure Rating: 4-inch wg positive and 0.5-inch wg negative.
   3. Maximum Air Velocity: 4000 fpm .
   4. Temperature Range: Minus 20 to plus 175 deg F.
   5. Water Vapor Permeance: maximum 0.17 perms (ASTM E 96, Procedure A).
   6. Insulation R-Value: R-4.2 minimum at 70 deg F.
   7. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
   8. NFPA 90A and NFPA 90B compliant.
   9. The sound attenuation (insertion loss) of the acoustical flexible air duct shall meet or exceed the values tabulated below

Straight Duct Insertion Loss in Decibels per Length of 10 Feet with No Airflow

Acoustical Flexible Air Duct Inner Diameter	Octave Band Center Frequency (Hz)						
	125	250	500	1000	2000	4000	8000
6 Inches	20	25	30	33	30	25	22
10 Inches	18	20	25	28	25	22	20
16 Inches	15	18	20	25	22	15	15

C. Flexible Duct Attachment:
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.

2.12 FLEXIBLE CONNECTORS

A. Manufacturers:
1. Durodyne.
2. Ventfabrics.

B. Materials: Flame-retardant or noncombustible fabrics. NFPA 90A compliant.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. 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 .

E. 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 .

F. 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 (Minus 55 to plus 260 deg C).

G. 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 .

H. 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.

2.13 DUCT SECURITY BARS

A. Description: Field- or factory-fabricated and field-installed duct security bars.

B. Configuration:
1. Sleeve: 3/16-inch , continuously welded steel frames, to be poured in place or set with concrete block or welded or bolted to wall, one side only. Duct connections on both sides.
2. Bars: Tool-resistant, steel, 7/8 inch diameter, spaced so that no opening is larger than 5 inches .

2.14 DUCT ACCESSORY HARDWARE

A. 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.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts**.**

B. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless integral backdraft damper is provided, and on outside air intakes as close as possible to the exterior. Separate backdraft damper is not required where control damper is indicated, or otherwise indicated

C. 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. Provide elevated dial or shaft extension for insulated ducts.
1. Utilize aluminum framed and blades for volume dampers in wet air streams, utilize galvanized steel blades and frames in all other locations.

2. Cut slot in end of volume damper rod (Quadrant End) to indicate blade position.
3. Provide galvanized sheet metal "hat section" for volume dampers on ducts with exterior insulation so that quadrant will be exposed.
4. Unless indicated otherwise below or on drawings volume dampers shall be standard design:
    a. Spaces with sound rating NC 30 and below: Low Leakage
    b.

D. Install cable-driven remote volume dampers for all volume dampers located in inaccessible ceilings or as indicated on Contract Drawings.
1. Locate wall box within 10 feet in accessible location.
2. Wall box shall be recessed-type in finished spaces.

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. Automatic balancing dampers installation
1. Install dampers at locations indicated on the drawings and in accordance with manufacturer's installation instructions.
2. Install dampers square and free from racking with blades orientation as scheduled or required.
3. Do not compress or stretch damper frame into duct or opening.
4. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jackshaft.
5. Control damper shall be installed in horizontal or vertical applications.
6. Install with minimum 5 diameters straight duct upstream of damper.
7. Where installed in horizontal applications, the set-point adjustment indicator shall be placed at the ‘6 o’clock position’, with the blade running vertically.
8. Where installed in horizontal applications, the set-point adjustment indicator shall be placed at the ‘12 o’clock position’.

H. Install fire and smoke dampers according to UL listing.

I. Fire Damper installation is required for all ductwork penetrating fire-rated walls, floors, and ceilings. Smoke damper installation is required for all ductwork penetrating smoke-rated partitions. Coordinate location and rating of fire and smoke dampers with Architectural Drawings. Provide dampers where required even if not shown on Mechanical Drawings.

J. Install fire and smoke dampers, with fusible links, according to manufacturer’s UL-approved written instructions.

K. Locate duct silencers a minimum of two equivalent duct diameters from elbows and fittings.

L. Install duct security bars. Construct duct security bars from 0.164-inch steel sleeve, continuously welded at all joints and 1/2-inch- diameter steel bars, 6 inches (150 mm) o.c. in each direction in center of sleeve. Weld each bar to steel sleeve and each crossing bar. Weld 2-1/2-by-2-1/2-by-1/4-inch steel angle to 4 sid

sleeve. Connect duct security bars to ducts with flexible connections. Provide 12-by-12-inch (300-by-300-mm) hinged access panel with cam lock in duct in each side of sleeve.

M. Sound Attenuators
1. Install where shown on Drawings in accordance with the manufacturer's recommendations to obtain the published acoustical and air flow performance.
2. Duct Silencer baffles should be oriented so as to be parallel to the plane of the turn if the silencer is located in a position less than 3 duct diameters in distance from the elbow. The duct diameter shall be based upon the maximum duct cross sectional dimension of the sound attenuator.
3. Do not locate rectangular sound attenuators within one duct diameter from elbows, fan suction or discharge openings, takeoffs, etc.
4. Support duct silencers independent of ductwork, **.**

N. Install turning vanes in all rectangular elbows.
1. Ductwork of pressure class +/- 2-inch w.g. or lower: single wall vanes.
2. Ductwork of pressure class +/- 3-inch w.g. and greater: double wall vanes.
3. Acoustical turning vanes are not to be used unless specifically indicated on the Contract Drawings.

O. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
1. On upstream **and downstream** side of duct coils.
2. Upstream **and downstream** from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from control 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.

P. Install access doors with swing against duct static pressure.

Q. Access Door Sizes:
1. Rectangular duct larger than 30 inches: 24 by 24 inches .
2. Rectangular duct up to 30 inches: 16 by 20 inches .
3. Rectangular duct up to 18 inches: 12 by 12 inches .
4. For ducts smaller than 18 inches: 2 inch less than duct height by 12 inch length.

R. Label access doors according to Section 23 05 53 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

S. Install duct test holes where required for testing and balancing purposes.

T. Flexible Connectors

1. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
2. Allow at least 1 inch slack in flexible connections to insure that no vibration is transmitted from fan to ductwork
3. On fans with a total static pressure of 5 inch w.g. or greater, 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.

U. Flexible Duct
1. Connect diffusers or light troffer boots to low pressure ducts with maximum 84-inch lengths of flexible duct clamped or strapped in place.
2. Connect flexible ducts to metal ducts with draw bands.
3. Installation of the acoustical flexible air duct shall be in accordance with the manufacturer's instructions and recommended procedures. Bends shall not have a radius of curvature smaller than 1.5 duct diameters. Before entering the rear of any diffuser, flexible duct must be straight and perpendicular to the diffuser for a minimum of 3 duct diameters.
4. Flexible duct must not be installed directly at the inlet or discharge of any volume control device

3.02 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

2

SECTION 26 08 00

COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

A. Section includes:

1. Electrical equipment connected to Normal electrical systems, including the following:

   a. Motor-control centers.
   b. Transformers.
   c. Secondary service electrical systems.
   d. Distribution and branch-circuit panelboards.
   e. Lightning protection systems.
   f. Grounding systems.

2. Electrical equipment connected to Essential electrical systems that provide an alternative source of power in the absence of power from the Normal electrical system, including the following:

   a. Motor-control centers.
   b. Secondary service electrical systems.
   c. Distribution and branch-circuit panelboards.
   d. Lighting protection systems.
   e. Grounding systems.
   f. Generators.
   g. UPS.

3. Controls and instrumentation, including the following:

   a. Equipment monitoring systems.
   b. Energy monitoring and control systems.
   c. Electrical metering and metering system.
   d. Demand response systems.
   e. Lighting control systems.
   f. Security systems.
   g. Fire-alarm systems.

B. Related Requirements:
   1. Section 019113 "General Commissioning Requirements" for general commissioning process requirements and Commissioning Coordinator responsibilities.

1.03 DEFINITIONS

A. BoD: Basis-of-Design Document, as defined in Section 019113 "General Commissioning Requirements."

B. Cx: Commissioning, as defined in Section 019113 "General Commissioning Requirements."

C. CxA: Commissioning Authority, as defined in Section 019113 "General Commissioning Requirements."

D. OPR: Owner's Project Requirements, as defined in Section 019113 "General Commissioning Requirements."

E. "Systems," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.04 INFORMATIONAL SUBMITTALS

A. Construction Checklists by CxA: Draft construction checklists will be created by CxA for Contractor review.

B. Construction Checklists by Contractor: Include the following and comply with requirements in Section 019113 "General Commissioning Requirements" for construction checklists:
1. Instrumentation and control for electrical systems.
2. Instrumentation and control for lighting control systems.
3. Liquid-filled transformers.
4. Dry-type transformers.
5. Instrument transformers.
6. Switchgear and switchboard assemblies rated 1200 A or greater.
7. Network protectors.
8. Surge protective devices.
9. Protective relays.
10. Metering devices.
11. Grounding systems.
12. Ground-fault protection systems.
13. Panelboards.
14. Receptacles and devices.
15. Automatic transfer switches.
16. Variable-frequency drives.
17. UPS systems.
18. Lighting.

1.05 QUALITY ASSURANCE

A. Test Equipment and Instruments: For all test equipment and instruments to be used in conducting Cx tests by Contractor, perform the following:
1. Submit test equipment and instrumentation list. For each equipment or instrument, identify the following:
a. Equipment/instrument identification number.

b. Planned Cx application or use.
c. Manufacturer, make, model, and serial number.
d. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.

2. Test equipment and instrumentation must meet the following criteria:
a. Capable of testing and measuring performance within the specified acceptance criteria.
b. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
c. Be maintained in good repair and operating condition throughout duration of use on Project.
d. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.

B. Proprietary Test Instrumentation and Tools:
1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, perform the following:
a. Submit proprietary instrumentation and tools list. For each instrument or tool, identify the following:
1) Instrument or tool identification number.
2) Equipment schedule designation of equipment for which the instrument or tool is required.
3) Manufacturer, make, model, and serial number.
4) Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.
b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
c. Electrical proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONSTRUCTION CHECKLISTS

A. Prepare detailed construction checklists for electrical systems, subsystems, equipment, and components. Complete and submit construction checklists.

3.02 CONSTRUCTION CHECKLIST REVIEW

A. Review and provide written comments on draft construction checklists. CxA will create required draft construction checklists and provide them to Contractor.

B. Return draft Construction Checklist review comments within 10 days of receipt.

C. When review comments have been resolved, CxA will provide final construction checklists, marked "Approved for Use, (date)."

D. Use only construction checklists, marked "Approved for Use, (date)."Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

3.03 GENERAL TESTING REQUIREMENTS

A. Certify that electrical systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating according to the Contract Documents and approved Shop Drawings and submittals.

B. Certify that electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved Shop Drawings and submittals, and that pretest set points have been recorded.

C. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

D. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions to verify compliance with acceptance criteria.

E. Test systems, assemblies, subsystems, equipment, and components operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and response according to acceptance criteria.

F. Construction Checklists: Prepare and submit detailed construction checklists for electrical systems, subsystems, equipment, and components.
   1. Contributors to development of construction checklists must include, but are not limited to, the following:
      a. Electrical systems and equipment installers.
      b. Electrical instrumentation and controls installers.

G. Perform tests using design conditions, whenever possible.
   1. Simulated conditions may, with approval of Architect, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA, and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
   2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
   3. Cx test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.

H. If tests cannot be completed because of a deficiency outside the scope of the electrical system, document the deficiency and report it to Owner. After deficiencies are resolved, reschedule tests.

I. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.

J. Coordinate schedule with, and perform Cx activities at the direction of the Cx.

K. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance tests requirements specified in Sections specifying electrical systems and equipment.

L. Provide qualified testing and inspecting agency personnel in accordance with Sections specifying electrical systems and equipment instrumentation, tools, and equipment to complete and document the following:
1. Performance tests.
2. Demonstration of a sample of performance tests.
3. Commissioning tests.
4. Commissioning test demonstrations.

3.04 CX TESTS FOR ELECTRICAL SYSTEMS

A. Verification of Normal Electrical System Operation:
1. Prerequisites: Acceptance of results for construction checklists for Division 26 electrical components associated with Normal electrical system.
2. Equipment and Systems to Be Tested: Division 26 electrical equipment.
3. Test Purpose: Verify operation of Normal electrical system.
4. Test Conditions: Energize components of Normal electrical system, one at a time.
5. Acceptance Criteria: Proper operation of Normal electrical system over a 24-hour period.

B. Verification of Essential Electrical System Operation:
1. Prerequisites:
a. Acceptance of results for construction checklists for Division 26 electrical components associated with Essential electrical system.
b. Completion of "Verification of Normal Electrical System Operation" tests.
2. Equipment and Systems to Be Tested: Division 26 electrical equipment.
3. Test Purpose: Verify operation of Essential electrical system.
4. Test Conditions:
a. Energize components of Normal electrical system.
b. Simulate a failure of Normal electrical system.
5. Acceptance Criteria: Transfer of power from Normal to Essential electrical system within OPR.

C. Verification of Control and Instrumentation:
1. Prerequisites: Acceptance of results for construction checklists.
a. Section 26 09 23 "Lighting Control Devices."
b. Section 26 09 43.23 "Relay-Based Lighting Controls."
c. Section 26 27 13 "Electricity Metering."

D. Test Purpose: Verify operation of control and monitoring systems for Normal and Essential electrical systems.

E. Test Conditions:

1. Energize components of Normal electrical system.
2. Test operation of equipment.

F. Acceptance Criteria: Operation of equipment according to OPR.

END OF SECTION

SECTION 26 11 16.12

SECONDARY UNIT SUBSTATIONS WITH SWITCHBOARD SECONDARY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Manufactured units.
2. Medium-voltage terminal compartment section.
3. Medium-voltage metal-enclosed switchgear section.
4. Medium-voltage instruments section.
5. Dry-type transformer section.
6. Secondary distribution section switchboard.
7. Low-voltage instruments section.
8. Identification devices.

B. Related Requirements:
1. Section 26 0010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 26 0011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 26 0513 "Medium-Voltage Cables" for requirements for terminating cables in incoming section of substation.

1.02 DEFINITIONS

A. ICCB: Insulated-case circuit breaker.

B. MCCB: Molded-case circuit breaker.

C. NETA ATS: Acceptance testing specification.

D. PCB: Polychlorinated biphenyl.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include rated capacities, operating characteristics, and 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.
2. Dimensioned plans and elevations showing major components and features.

a. Include a plan view and cross section of equipment base, showing clearances, manufacturer's recommended workspace that accounts for breaker service and removal, and locations of penetrations for grounding and conduits.
3. One-line diagram.
4. List of materials.
5. Nameplate legends.
6. The material, size and number of bus bars, and current rating for each bus, including mains and branches of phase, neutral, and ground buses.
7. Short-time and short-circuit current ratings of secondary unit substations and components.
8. Ratings of individual protective devices.

C. Design Data:
1. Time-Current Characteristic Curves: For overcurrent protective devices.
2. Primary Fuses: Submit recommendations and size calculations.
3. Utility company's metering provisions with indication of approval by utility company.

1.04 INFORMATIONAL SUBMITTALS

A. Provide ¼" scale drawing demonstrating that installation has been coordinated with work of other trades. Use actual dimensions from approved equipment submittals to coordinate layout and installation of substation and components with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Product Certificates: For secondary unit substations, signed by product manufacturer.

C. Factory test reports.

D. Field quality-control reports.

1.05 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. Spare Fuses: Six of each type and rating of fuse and fusible device used, except for medium-voltage fuses. Include spares for the following:
a. Primary disconnect fuses.
b. Potential transformer fuses.
c. Control power fuses.
d. Fuses and fusible devices for fused circuit breakers.
e. Fuses for secondary fusible devices.
2. Spare Indicating Lights: Six of each type installed.
3. Touchup Paint: Three half-pint containers of paint matching enclosure's exterior finish.
4. Primary Switch Contact Lubricant: One container(s).
5. One set(s) of spare mounting gaskets for bushings, handholes, and the gasket between relief cover and flange of pressure-relief device.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver in shipping splits in sizes that can be moved past obstructions in delivery path.

B. Coordinate delivery of secondary unit substations to allow movement into designated space.

C. Store secondary unit substation components protected from weather and so condensation will not form on or in units. Provide temporary heating in accordance with manufacturer's instructions.

D. Handle secondary unit substation components in accordance with manufacturer's instructions. Use factory-installed lifting provisions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Square D; Schneider Electric USA.
2. ABB, Electrification Business.
3. Eaton.
4. Siemens Industry, Inc., Energy Management Division.

2.02 SYSTEM DESCRIPTION

A. Description: Medium-voltage, primary incoming section; transformer section; and low-voltage secondary switchgear section; and including coordinated circuit breakers, fusible switches, and metering components.

B. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by a qualified electrical testing agency, and marked for intended location and application.

C. Comply with IEEE C2.

D. Comply with IEEE C37.121.

2.03 MANUFACTURED UNITS

A. Indoor Unit Arrangement: Single assembly.

B. Outdoor Unit Arrangement: Single assembly.
1. Weatherproof, listed for installation outdoors, complying with IEEE C37.20.1.
2. Aisleless Construction: Full-height doors in front of basic weatherproof equipment.

C. Connections between the primary device and transformer must be cable, and between the transformer and secondary must be flexible bus braid unless noted otherwise.

D. Indoor Enclosure: Steel.

E. Outdoor Enclosure: Weatherproof, galvanized steel, listed for installation outdoors, complying with IEEE C37.20.1. Aisleless, full-height doors, with provisions for padlocking, in front of basic weatherproof equipment. Integral structural-steel base frame with factory-applied asphaltic undercoating.
   1. Each compartment must have the following features:
      a. Structural design and anchorage adequate to resist loads imposed by 125 mph wind.
      b. Space heater operating at one-half or less of rated voltage, sized to prevent condensation, controlled by thermostats to maintain temperature of each section above expected dew point.
      c. Louvers equipped with insect and rodent screens and filters, and arranged to permit air circulation while excluding rodents and exterior dust.
      d. Weatherproof ground-fault circuit interrupter duplex receptacle.
      e. Power for heaters and receptacles must be provided by control power transformer.
      f. Skid Mounted: Mount each shipping group on an integral base frame as a complete weatherproof unit.

F. Enclosure Finish:
   1. Outdoor Finish: Provide factory-applied finish in manufacturer's standard color, including under surfaces treated with corrosion-resistant undercoating.
   2. Indoor Finish: Provide factory-applied finish in manufacturer's standard gray over a rust-inhibiting primer on treated metal surface.
   3. Severe Environment Finish: Provide factory-applied corrosion-resistant finish in manufacturer's standard color that withstands 480 hours of exposure to the salt spray test specified in ASTM B117 without loss of paint or release of adhesion of the paint primer coat to the metal surface in excess of 1/16 inch from the test mark. The scribed test mark and test evaluation must be conducted in accordance with ASTM D1654, with a rating of not less than 7 arrived at in accordance with Table 1 (procedure A). Cut edges or otherwise damaged surfaces of hot-dip galvanized sheet steel or mill-galvanized sheet steel must be coated with a manufacturer's standard zinc-rich paint.

2.04 MEDIUM-VOLTAGE TERMINAL COMPARTMENT SECTION

A. Primary Incoming Section: Terminal assembly with adequate space for incoming-cable terminations and surge arresters, complying with NEMA SG4 and meeting thermal, mechanical, and dielectric requirements specified for the transformer section.

B. Ratings: Suitable for application in three-phase, 60 Hz, solidly grounded-neutral system.

C. System Voltage: 13.8 kV nominal; 15 kV maximum.

D. Surge Arresters: Comply with IEEE C62.11, Distribution Class; metal-oxide-varistor type, connected in each phase of incoming circuit and ahead of disconnecting device.

2.05 MEDIUM-VOLTAGE METAL-ENCLOSED SWITCHGEAR SECTION

A. Metal-enclosed, air-interrupter switchgear, with fuses, complying with IEEE C37.20.3.
   1. Switchgear must be arc-resistant, complying with IEEE C37.20.7, Type 2A.

B. Ratings: Comply with IEEE C37.04; and suitable for application in three-phase, 60 Hz, solidly grounded-neutral system.
   1. System Voltage: As indicated on construction documents
   2. Design Level of Available-Source Fault Current: Integrated short-circuit rating consistent with value of fault current indicated.
   3. Main-Bus Rating: Continuous bus rating as indicated on construction documents.

C. Interrupter Switches: Stationary, gang operated, and suitable for application at maximum short-circuit rating of integrated switchgear assembly.
   1. Rating: 600 A continuous duty and load break.
   2. Two-Time Duty-Cycle Fault Closing: 40 000 A, asymmetrical.
   3. Switch Action: No external arc and no significant quantities of ionized gas released into the enclosure.
   4. Switch Construction: Supported entirely by interior framework of structure, with copper switchblades and stored-energy operating mechanism.
   5. Phase Barriers: Full length of switchblades and fuses for each pole; designed for easy removal; allow visual inspection of switch components if barrier is in place.
   6. Protective Shields: Cover live components and terminals.
      a. Fuse Mounts: Single-frame mounted and de-energized when switch is open.
   7. Mechanical Interlock: Prevent opening switch compartment door unless switchblades are open, and prevent closing switch if door is open. Interlock air-interrupter switch with transformer secondary main circuit breaker, preventing switch from being opened or closed unless secondary main circuit breaker is open.
   8. Window: Permits viewing switch-blade positions when door is closed.
   9. Accessory Set: Tools and miscellaneous items required for interrupter switchgear test, inspection, maintenance, and operation. Include fuse-handling tool as recommended by switchgear manufacturer.

D. Fuses: Sizes recommended by secondary unit substation manufacturer, considering fan cooling, temperature-rise specification, and cycle loading.
   1. Expulsion Fuses: Furnished in disconnect-type mountings and renewable with replacement fuse units. Gases emitted on interruption are controlled and silenced by chambers designed for that purpose.
   2. Indicator integral with each fuse to show when it has blown.
   3. Spares: Include three fuses in use and three spare fuses in storage clips in each switch.

E. Surge Arresters: Comply with IEEE C62.11, Distribution Class; metal-oxide-varistor type, with ratings as indicated, connected in each phase of incoming circuit and ahead of disconnecting device.

2.06 MEDIUM-VOLTAGE INSTRUMENTS SECTION

A. Instrument Transformers: Comply with IEEE C57.13.

1. Potential and Current Transformers: Burden and Accuracy Class suitable for connected meters.

B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems.
   1. Inputs from sensors or 5 A current-transformer secondaries, and potential terminals rated to 600 V.
   2. Switch-selectable digital display with the following features:
      a. Phase Currents, Each Phase: Plus or minus 1 percent.
      b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
      c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
      d. Three-Phase Real Power: Plus or minus 2 percent.
      e. Three-Phase Reactive Power: Plus or minus 2 percent.
      f. Power Factor: Plus or minus 2 percent.
      g. Frequency: Plus or minus 0.5 percent.
      h. Integrated Demand, with Demand Interval Selectable from 5 to 60 Minutes: Plus or minus 2 percent.
      i. Accumulated energy, in megawatt-hours, plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.
   3. Communications module suitable for remote monitoring of meter quantities and functions. Interface communication and metering requirements in accordance with Section 26 0913 "Electrical Power Monitoring and Control."
   4. Mounting: Display and control unit that is flush or semiflush mounted in instrument compartment door.

2.07 DRY-TYPE TRANSFORMER SECTION

A. Description: IEEE C57.12.01, IEEE C57.12.50, and dry-type, two-winding, secondary unit substation transformer.

B. Primary Incoming Section: Transformer cover-mounted bushings. The bushings must meet thermal, mechanical, and dielectric requirements as specified for the transformer section.

C. Style:
   1. Totally enclosed, nonventilated, vacuum-pressure, impregnated type, and with insulation system rated at 220 deg C with an 80 deg C average winding temperature rise above a maximum ambient temperature of 104 deg F.

D. Cooling System:
   1. Class AA/FA, air cooled with provisions for future forced-air rating, complying with IEEE C57.12.01.
      a. Automatic forced-air cooling system controls, including thermal sensors, fans, control wiring, temperature controller with test switch, power panel with current-limiting fuses, indicating lights, alarm, and alarm-silencing relay.
      b. Include mounting provision for fans.

E. Insulation Materials: IEEE C57.12.01, rated 220 deg C.
   1. Insulation Temperature Rise: 80 deg C, maximum rise above 104 deg F.

F. BIL: 60 kV.

G. Full-Capacity Voltage Taps: Four nominal 2.5 percent taps, two above and two below rated primary voltage.

H. Impedance: 7.3 percent.

I. High-Temperature Alarm: Sensor at transformer with local audible and visual alarm and contacts for remote alarm.

2.08 SECONDARY DISTRIBUTION SECTION SWITCHBOARD

A. The secondary distribution section must be drawout,, low-voltage switchgear, complying with NEMA PB 2 and UL 891.

B. Switchboard Structure: Front and rear accessible.
1. Match and align the front and rear of the switchgear.
2. Comply with UL requirements for service entrance equipment.

C. Switchboard Bus:
1. Use bus bars to connect compartments and vertical sections. Cable connections are not permitted.
2. Main Phase Bus: Uniform capacity the entire length of section.
3. Neutral Bus: 100 percent of phase-bus ampacity, except as indicated. Equip bus with pressure-connector terminations for outgoing circuit neutral conductors. Include braces for neutral-bus extensions for busway feeders.
4. Vertical Section Bus: Extend to spaces for future circuit breakers.
5. Phase- and Neutral-Bus Material:
   a. Hard-drawn copper of 98 percent minimum conductivity, with copper feeder circuit-breaker line connections.
6. Ground Bus: Hard-drawn copper of 98 percent minimum conductivity, with pressure connector for feeder and branch-circuit ground conductors, minimum size 1/4-by-2 inch.
7. Neutral bus equipped with pressure-connector terminations for outgoing circuit neutral conductors. Neutral-bus extensions for busway feeders are braced.
8. Neutral Disconnect Link: Bolted, uninsulated, 1/4-by-2 inch copper bus, arranged to connect neutral bus to ground bus.

D. Switchboard Arrangement:
1. Main Disconnect Device(s): MCCBs.
2. Feeder Protective Devices: MCCBs.

E. MCCBs (to 2500 A): Fixed-mounted, manually operated air-circuit breakers. Comply with UL 489.
1. With quick-make, quick-break, over-center switching mechanism that is mechanically trip-free, and its position is shown by the position of the handle. With manual push-to-trip push button.
2. Solid-state monitoring and tripping system to provide system status monitoring, adjustable time-current protection, and shunt trip.
   a. Interchangeable current sensors and timing circuits for adjustable time-current protection settings and status signals.

b. With trip-setting dials or interchangeable plugs to establish the continuous trip of the circuit breaker. Plugs must not be interchangeable between frames, and the breaker may not be closed without the plug. With neutral ground-fault sensor.
c. Time-current adjustments to achieve protective-device coordination as follows:
   1) Adjustable long-time delay.
   2) Adjustable short-time setting and delay to shape the time-current curve.
   3) Adjustable instantaneous setting.
   4) Individually adjustable ground-fault setting and time delay.
d. With built-in connector to test the long-time delay, instantaneous, and ground-fault functions of the breaker. Provide one test set for testing installed circuit breakers with 225 A frame and higher.
e. With built-in digital ammeter display, showing load current and tripping cause.

F. MCCBs (1600 to 2500 A): Fixed-mounted, manually operated air-circuit breakers. Comply with UL 489.
   1. With quick-make, quick-break, over-center switching mechanism that is mechanically trip-free, and its position is shown by the position of the handle. With manual push-to-trip push button.
   2. Solid-state monitoring and tripping system to provide system status monitoring, adjustable time-current protection, and shunt trip.
      a. Interchangeable current sensors and timing circuits for adjustable time-current protection settings and status signals.
      b. LED indicators or display, with manual reset, to show reasons of automatic trip.
      c. Display panel to indicate that the status of the system circuitry is fully operational, or give fault location based on automatic diagnosis.
      d. Trip the circuit breaker when closing on a fault.
      e. Time-current adjustments to achieve protective-device coordination as follows:
         1) Adjustable long-delay pickup and time.
         2) Individual adjustments for short-delay pickup, time, and I-squared-t setting.
         3) Adjustable instantaneous pickup.
         4) Individually adjustable ground-fault pickup and time, with I-squared-t setting.
      f. One test kit to test each trip function.
      g. Battery backup for informational displays after automatic trip, with battery status indicator.

2.09 LOW-VOLTAGE INSTRUMENTS SECTION

A. Instrument Transformers: Comply with IEEE C57.13.
   1. Potential Transformers: Secondary voltage rating of 120 V and NEMA C 12.11 Accuracy Class of 0.3 with burdens of W, X, and Y.
   2. Current Transformers: Burden and Accuracy Class suitable for connected relays, meters, and instruments.

B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems.
   1. Inputs from sensors or 5 A current-transformer secondaries, and potential terminals rated to 600 V.
   2. Switch-selectable digital display with the following features:
      a. Phase Currents, Each Phase: Plus or minus 1 percent.
      b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
      c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
      d. Three-Phase Real Power: Plus or minus 2 percent.
      e. Three-Phase Reactive Power: Plus or minus 2 percent.
      f. Power Factor: Plus or minus 2 percent.
      g. Frequency: Plus or minus 0.5 percent.
      h. Integrated Demand, with Demand Interval Selectable from 5 to 60 Minutes: Plus or minus 2 percent.
      i. Accumulated energy, in megawatt hours, plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.
   3. Communications module suitable for remote monitoring of meter quantities and functions. Interface communication and metering requirements in accordance with Section 26 0913 "Electrical Power Monitoring and Control."
   4. Mounting: Display and control unit that is flush or semiflush mounted in instrument compartment door.

C. Relays: Comply with IEEE C37.90, types and settings as indicated; with test blocks and plugs.

D. Surge Suppression: Factory installed as an integral part of the low-voltage switchgear, complying with UL 1449 SPD, Type 1, with the following features and accessories:
   1. Integral disconnect switch.
   2. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
   3. Indicator light display for protection status.
   4. Form-C contacts rated at 5 A and 250 V(ac), one N.O. and one N.C., for remote monitoring of protection status.
   5. Surge counter.

E. Control Power Supply: Control power transformer supplying 120 V control circuits through secondary disconnect devices.

F. Control Wiring: Factory installed, complete with bundling, lacing, and protection; and complying with the following:
   1. Flexible conductors for No. 8 AWG and smaller, for conductors across hinges and for conductors for interconnections between shipping units.
   2. Conductors sized in accordance with NFPA 70 for duty required.

G. Maintenance Tools: Furnish tools and miscellaneous items required for circuit-breaker and switchgear test, inspection, maintenance, and operation.
   1. Racking handle to manually move circuit breaker between "connected" and "disconnected" positions.
   2. Portable test set for testing functions of circuit-breaker, solid-state trip devices without removal from switchboard.

3. Relay and meter test plugs suitable for testing switchgear meters and switchgear class relays.
4. Circuit-Breaker Removal Apparatus: Portable, floor-supported, roller-base, elevating carriage arranged for moving circuit breakers in and out of compartments.
5. Spare-Fuse Cabinet: Identified and compartmented steel box or cabinet with lockable door.
6. Storage for Manual: Include a rack or holder, near the operating instructions, for a copy of maintenance manual.

2.10 IDENTIFICATION DEVICES

A. Compartment Nameplates: Engraved, laminated-plastic or metal nameplate for each compartment, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 26 0553 "Identification for Electrical Systems."

2.11 SOURCE QUALITY CONTROL

A. Factory Tests:
1. Perform design and routine tests in accordance with standards specified for components. Conduct transformer tests in accordance with IEEE C57.12.90. Conduct switchgear and switchboard tests in accordance with NEMA C37.51.
2. Perform the following factory-certified tests on each secondary unit substation:
a. Resistance measurements of windings on the rated voltage connection and on tap extreme connections.
b. Ratios on the rated voltage connection and on tap extreme connections.
c. Polarity and phase relation on the rated voltage connection.
d. No-load loss at rated voltage on the rated voltage connection.
e. Exciting current at rated voltage on the rated voltage connection.
f. Impedance and load loss at rated current on the rated voltage connection and on tap extreme connections.
g. Applied potential.
h. Induced potential.
i. Temperature Test: If a transformer is supplied with auxiliary cooling equipment to provide more than one rating, test at lowest kVA Class ONAN or Class AA rating and highest kVA Class ONAF or Class AFA rating.
1) Temperature test is not required if a record of a temperature test on an essentially duplicate unit is available.
j. Owner will witness required factory tests. Notify Architect at least 14 days before date of tests and indicate their approximate duration.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and space conditions for compliance with requirements for secondary unit substations and other conditions affecting performance of the Work.

B. Examine roughing-in of conduits and grounding systems to verify the following:
1. Wiring entries comply with layout requirements.

2. Entries are within conduit-entry tolerances specified by manufacturer, and no feeders will have to cross section barriers to reach load or line lugs.

C. Examine walls, floors, roofs, and concrete bases for suitable conditions for secondary unit substation installation.

D. Verify that ground connections are in place and that requirements in Section 26 0526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance must be 5 ohms at secondary unit substation location.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with applicable portions of NECA 400, NECA 410, NECA 430, and NEMA SG 11.

B. Install secondary unit substations on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 03 3000 "Cast-in-Place Concrete."

C. Comply with requirements for vibration isolation and seismic control devices specified in Section 26 0529 "Hangers and Supports for Electrical Systems" and Section 26 0548.16 "Seismic Controls for Electrical Systems."

D. Maintain minimum clearances and workspace at equipment in accordance with manufacturer's instructions and NFPA 70.

3.03 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."
1. Install the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 ft. apart.
2. Install arc-flash warning labels specified in Section 26 0573.19 "Arc-Flash Hazard Analysis."

B. Operating Instructions: Place printed operating instructions for secondary unit substations, including key interlocking, control sequences, elementary single-line diagram, and emergency procedures with the maintenance materials.

3.04 CONNECTIONS

A. Ground equipment in accordance with Section 26 0526 "Grounding and Bonding for Electrical Systems."
1. At Interior Locations: For grounding to grounding electrodes, use bare copper cable not smaller than No. 4/0 AWG. Bond surge arrester and neutrals directly to the transformer enclosure and then to the grounding electrode system with bare copper conductors. Keep leads as short as practicable with no kinks or sharp bends. Make joints in grounding conductors and loops by exothermic weld or compression connector.

2. At Exterior Locations:
   a. For counterpoise, use tinned bare copper cable not smaller than No. 4/0 AWG, buried not less than 30 inch below grade interconnecting the grounding electrodes. Bond surge arrester and neutrals directly to the transformer enclosure and then to the grounding electrode system with bare copper conductors, sized as shown. Keep lead lengths as short as practicable with no kinks or sharp bends.
   b. Fence and equipment connections must not be smaller than No. 4 AWG. Ground fence at each gate post and corner post and at intervals not exceeding 10 ft.. Bond each gate section to the fence post using 1/8 by 1 inch tinned flexible braided copper strap and clamps.
   c. Make joints in grounding conductors and loops by exothermic weld or compression connector.

B. Connect wiring in accordance with Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables."

3.05 CLEANING

A. After completing equipment installation and before energizing, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish. Vacuum interiors of secondary unit substation sections.

3.06 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Architect authorities having jurisdiction.

B. General Field Testing Requirements:
   1. Comply with the provisions of NFPA 70B Ch. 11, "Testing and Test Methods."
   2. Perform each visual and mechanical inspection and electrical test. Certify compliance with test parameters.
   3. After installing secondary unit substation but before primary is energized, verify that grounding system at the substation is tested at the specified value or less.
   4. After installing secondary unit substation and after electrical circuitry has been energized, test for compliance with requirements.
   5. Visual and Mechanical Inspection:
      a. Verify equipment nameplate data complies with Contract Documents.
      b. Inspect bolted electrical connections for high resistance using one of the following two methods:
         1) Use a low-resistance ohmmeter to compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
         2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS, Table 100.12. Bolt-torque levels must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS, Table 100.12.

C. Switchgear Field Tests:

1. Visual and Mechanical Inspection:
   a. Inspect physical and mechanical condition.
   b. Inspect anchorage, alignment, grounding, and required area clearances.
   c. Verify the unit is clean and shipping bracing, loose parts, and documentation shipped inside cubicles have been removed.
   d. Verify that fuse and circuit-breaker sizes and types correspond to Drawings and coordination study as well as the address of the circuit breaker that is used to identify it in microprocessor-communication software.
   e. Verify that current and voltage-transformer ratios correspond to Drawings.
   f. Confirm correct operation and sequencing of electrical and mechanical interlock systems.
      1) Attempt closure on locked-open devices. Attempt to open locked-closed devices.
      2) Make key exchange with devices operated in off-normal positions.
   g. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
   h. Inspect insulators for evidence of physical damage or contaminated surfaces.
   i. Verify correct barrier and shutter installation and operation.
   j. Exercise active components.
   k. Inspect mechanical indicating devices for correct operation.
   l. Verify that filters are in place and vents are clear.
   m. Inspect control power transformers as follows:
      1) Inspect for physical damage, cracked insulation, broken leads, connection tightness, defective wiring, and overall general condition.
      2) Verify that primary- and secondary-use or circuit-breaker ratings match Drawings and comply with manufacturer's recommendations.
      3) Verify correct functioning of drawout disconnecting and grounding contacts and interlocks.
2. Electrical Tests:
   a. Perform dc voltage insulation-resistance tests on each bus section, phase-to-phase and phase-to-ground, for one minute. If the temperature of the bus is other than plus or minus 20 deg C, adjust the resulting resistance as provided in NETA ATS Table 100.11.
      1) Insulation-resistance values of bus insulation must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Investigate and correct values of insulation resistance less than manufacturer's recommendations or NETA ATS, Table 100.1.
      2) Do not proceed to the dielectric-withstand-voltage tests until insulation-resistance levels are raised above minimum values.
   b. Perform a dielectric-withstand-voltage test on each bus section, each phase-to-ground with phases not under test grounded, in accordance with manufacturer's published data. If manufacturer has no recommendation for this test, it must be conducted in accordance with NETA ATS, Table 100.2. Apply the test voltage for one minute.
      1) If no evidence of distress or insulation failure is observed by the end of the total time of voltage application during the dielectric-withstand-voltage test, the test specimen is considered to have passed the test.
   c. Voltage Transformers:

1) Perform secondary wiring integrity test. Verify correct potential at devices.
2) Verify secondary voltages by energizing the primary winding with system voltage.

d. Perform current-injection tests on the entire current circuit in each section of switchgear.
1) Perform current tests by secondary injection with magnitudes such that a minimum current of 1.0 A flows in the secondary circuit. Verify correct magnitude of current at each device in the circuit.
2) Perform current tests by primary injection with magnitudes such that a minimum of 1.0 A flows in the secondary circuit. Verify correct magnitude of current at each device in the circuit.

e. Verify operation of space heaters.
f. Perform phasing checks on double-ended or dual-source switchgear to ensure correct bus phasing from each source.

D. Medium-Voltage Surge Arrester Field Tests:
1. Visual and Mechanical Inspection:
a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify the arresters are clean.
d. Verify that the ground lead on each device is individually attached to a ground bus or ground electrode.
e. Verify that the stroke counter is correctly mounted and electrically connected if applicable. Record the stroke counter reading.
2. Electrical Test:
a. Perform an insulation-resistance test on each arrester, phase terminal-to-ground. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Replace units that fail to meet recommended minimum insulation resistance listed in the table.
b. Perform a watts-loss test. Evaluate watts-loss values by comparison with similar units and test equipment manufacturer's published data.

E. Instrument Transformer Field Tests:
1. Visual and Mechanical Inspection:
a. Inspect physical and mechanical condition.
b. Verify correct connection of transformers with system requirements.
c. Verify that adequate clearances exist between primary and secondary circuit wiring.
d. Verify the unit is clean.
e. Verify that required grounding and shorting connections provide contact.
f. Verify correct operation of transformer withdrawal mechanism and grounding operation.
g. Verify correct primary- and secondary-fuse sizes for voltage transformers.
h. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
2. Electrical Tests of Current Transformers:
a. Perform insulation-resistance test of each current transformer and its secondary wiring with respect to ground at 1000 V(dc) for one minute. For units with solid-state components that cannot tolerate the applied voltage,

comply with manufacturer's recommendations. Insulation-resistance values of instrument transformers must not be less than values shown in NETA ATS, Table 100.5.

b. Perform a polarity test of each current transformer in accordance with IEEE C57.13.1. Polarity results must agree with transformer markings.

c. Perform a ratio-verification test using the voltage or current method in accordance with IEEE C57.13.1. Ratio errors must comply with IEEE C57.13.

d. Perform an excitation test on transformers used for relaying applications in accordance with IEEE C57.13.1. Excitation results must match the curve supplied by the manufacturer or must comply with IEEE C57.13.1.

e. Measure current circuit burdens at transformer terminals in accordance with IEEE C57.13.1. The measured burdens must match the instrument transformer Accuracy Class rating.

f. Perform insulation-resistance tests on the primary winding with the secondary grounded. Test voltages must comply with NETA ATS, Table 100.5. The insulation-resistance value must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5.

g. Perform dielectric-withstand-voltage tests on the primary winding with the secondary grounded. Test voltages must comply with NETA ATS, Table 100.9. If no evidence of distress or insulation failure is observed by the end of the total time of voltage application, the primary winding is considered to have passed the test.

h. Perform power-factor or dissipation-factor tests in accordance with test equipment manufacturer's published data. Power-factor or dissipation-factor values must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with test equipment manufacturer's published data.

i. Verify that current-transformer secondary circuits are grounded and have only one grounding point in accordance with IEEE C57.13.3.

3. Electrical Tests of Voltage and Potential Transformers:

a. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply the test voltage for one minute in accordance with NETA ATS, Table 100.5. For units with solid-state components that cannot tolerate the applied voltage, follow manufacturer's recommendations. Insulation-resistance values of instrument transformers must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5.

b. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Test voltages must be applied for one minute in accordance with NETA ATS, Table 100.5. Insulation-resistance values of the transformers must not be less than values shown in NETA ATS, Table 100.5.

c. Perform a polarity test on each transformer to verify the polarity marks or H(1)- X(1) relationship. Polarity results must agree with transformer markings.

d. Perform a turns-ratio test on tap positions. Ratio errors must not exceed the tolerances specified in IEEE C57.13.

e. Measure voltage circuit burdens at transformer terminals. Measured burdens must be compared to instrument transformer ratings. The

measured burdens must match the instrument transformer Accuracy Class rating.

f. Perform a dielectric-withstand-voltage test on the primary windings with the secondary windings connected to ground. The dielectric voltage must comply with NETA ATS, Table 100.9. The test voltage must be applied for one minute. If no evidence of distress or insulation failure is observed by the end of the total time of voltage application during the dielectric-withstand-voltage test, the primary windings are considered to have passed the test.

g. Perform power-factor or dissipation-factor tests in accordance with test equipment manufacturer's published data. Power-factor or dissipation-factor values must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with test equipment manufacturer's published data.

h. Verify that voltage-transformer secondary circuits are grounded and have only one grounding point in accordance with IEEE C57.13.3.

F. Microprocessor-Based Protective Relay Field Tests:

1. Visual and Mechanical Inspection:
   a. Record model number, style number, serial number, firmware revision, software revision, and rated control voltage.
   b. Verify operation of light-emitting diodes, display, and targets.
   c. Record passwords for each access level.
   d. Clean the front panel and remove foreign material from the case.
   e. Check tightness of connections.
   f. Verify that the frame is grounded in accordance with manufacturer's instructions.
   g. Set the relay in accordance with results in Section 26 0573.16 "Coordination Studies" and in Section 26 0573.19 "Arc-Flash Hazard Analysis."
   h. Download settings from the relays. Print a copy of the settings for the report and compare the settings to those specified in the coordination study.
2. Electrical Tests:
   a. Perform insulation-resistance tests from each circuit to the grounded frame in accordance with manufacturer's published data.
   b. Apply voltage or current to analog inputs, and verify correct registration of the relay meter functions.
   c. Functional Operation: Check functional operation of each element used in the protection scheme.

G. Liquid-Filled Transformer Section Field Tests:

1. Visual and Mechanical Inspection:
   a. Inspect physical and mechanical condition.
   b. Inspect impact recorder prior to unloading.
   c. Test dew point of tank gases if applicable.
   d. Inspect anchorage, alignment, and grounding.
   e. Verify the presence of PCB content labeling.
   f. Verify removal of shipping bracing after placement.
   g. Verify the bushings are clean.

h. Verify that alarm, control, and trip settings on temperature and level indicators are set and operate within manufacturer's recommended settings.
i. Verify that cooling fans and pumps operate correctly and have appropriate overcurrent protection.
j. Verify that liquid level in tanks and bushings is within manufacturer's published tolerances.
k. Perform specific inspections and mechanical tests recommended by the manufacturer.
l. Verify presence of transformer surge arresters and that their ratings are as specified.
m. Verify that as-left tap connections are as specified.
n. Verify the presence of surge arresters and that their ratings are as specified.

2. Electrical Tests:
   a. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index; the value of the index must not be less than 1.0.
   b. Perform power-factor or dissipation-factor tests on windings in accordance with test equipment manufacturer's published data. Maximum winding insulation power-factor/dissipation-factor values must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.3.
   c. Measure core insulation resistance at 500 V(dc) if the core is insulated and the core ground strap is removable. Core insulation-resistance values must not be less than 1 megohm at 500 V(dc).
   d. Perform a power-factor or dissipation-factor tip-up test on windings greater than 2.5 kV.
   e. Perform turns-ratio tests at tap positions. Turns-ratio test results must not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If the test fails, replace the transformer.
   f. Perform an excitation-current test on each phase. The typical excitation-current test data pattern for a three-legged core transformer is two similar current readings and one lower current reading. Investigate and correct if the test shows a different pattern.
   g. Measure the resistance of each winding at each tap connection, and record temperature-corrected winding-resistance values in the Operations and Maintenance Manual.
   h. Perform an applied-voltage test on high- and low-voltage windings-to-ground. Comply with IEEE C57.12.91, Sections 10.2 and 10.9.
   i. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.
   j. Remove a sample of insulating liquid in accordance with ASTM D923. Insulating liquid values must comply with NETA ATS, Table 100.4. Sample must be tested for the following:
      1) Dielectric Breakdown Voltage: ASTM D877 or ASTM D1816.
      2) Acid Neutralization Number: ASTM D974.
      3) Specific Gravity: ASTM D1298.

4) Interfacial Tension: ASTM D971.
5) Color: ASTM D1500.
6) Visual Condition: ASTM D1524.
7) Water in Insulating Liquids: ASTM D1533.
8) Power Factor or Dissipation Factor: ASTM D924.

k. Remove a sample of insulating liquid in accordance with ASTM D923 and perform dissolved-gas analysis in accordance with IEEE C57.104 or ASTM D3612.

H. Dry-Type Transformer Section Field Tests:
1. Visual and Mechanical Inspection:
a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, and grounding.
c. Verify that resilient mounts are free and that shipping brackets have been removed.
d. Verify the unit is clean.
e. Verify that alarm, control, and trip settings on temperature and level indicators are set and operate within manufacturer's recommended settings.
f. Verify that cooling fans operate and that fan motors have correct overcurrent protection.
g. Perform specific inspections and mechanical tests recommended by the manufacturer.
h. Verify that as-left tap connections are as specified.
i. Verify the presence of surge arresters and that their ratings are as specified.
2. Electrical Tests:
a. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index; the value of the index must not be less than 1.0.
b. Perform power-factor or dissipation-factor tests on windings in accordance with the test equipment manufacturer's published data. Investigate and correct power-factor values that exceed:
1) 2.0 percent for power transformers.
2) 5.0 percent for distribution transformers.
3) Measure core insulation resistance at 500 V dc if the core is insulated and the core ground strap is removable. Core insulation-resistance values must not be less than 1 megohm at 500 V(dc).
c. Perform a power-factor or dissipation-factor tip-up test on windings greater than 2.5 kV. Tip-up test result exceeding 1.0 percent must be investigated.
d. Perform turns-ratio tests at tap positions. The test results must not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If the test fails, replace the transformer.
e. Perform an excitation-current test on each phase. The typical excitation-current test data pattern for a three-legged core transformer is two similar current readings and one lower current reading. Investigate and correct if the test shows a different pattern.
f. Measure the resistance of each winding at each tap connection.

g. Perform an applied-voltage test on high- and low-voltage windings-to-ground. See IEEE C57.12.91, Sections 10.2 and 10.9. The ac dielectric-withstand-voltage test result must not exceed 75 percent of factory test voltage for one-minute duration. The dc dielectric-withstand-voltage test result must not exceed 100 percent of the ac RMS test voltage specified in IEEE C57.12.91, Section 10.2, for one-minute duration. If no evidence of distress or insulation failure is observed by the end of the total time of voltage application during the dielectric-withstand-voltage test, the test specimen is considered to have passed the test.
h. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.

I. Low-Voltage Power Circuit-Breaker Field Tests:
1. Visual and Mechanical Inspection:
a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, and grounding.
c. Verify that maintenance devices are available for servicing and operating the breaker.
d. Verify the unit is clean.
e. Verify that the arc chutes are intact.
f. Inspect moving and stationary contacts for condition and alignment.
g. Verify that primary and secondary contact wipe and other dimensions vital to satisfactory operation of the breaker are correct.
h. Perform mechanical operator and contact alignment tests on both the breaker and its operating mechanism in accordance with manufacturer's published data.
i. Verify cell fit and element alignment.
j. Verify racking mechanism operation.
k. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
l. Perform adjustments for final protective-device settings in accordance with coordination study provided by end user.
m. Record as-found and as-left operation counter readings.
2. Electrical Tests:
a. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Insulation-resistance values must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Values of insulation resistance less than this table or manufacturer's recommendations must be investigated.
b. Measure contact resistance across each power contact of the circuit breaker. Microhm or dc millivolt drop values must not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's published data is not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
c. Determine long-time pickup and delay by primary current injection. Long-time pickup values must be as specified, and the trip characteristic must

not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors. If manufacturer's curves are not available, trip times must not exceed the value shown in NETA ATS, Table 100.7.

d. Determine short-time pickup and delay by primary current injection. Short-time pickup values must be as specified, and the trip characteristic must not exceed manufacturer's published time-current tolerance band.

e. Determine ground-fault pickup and delay by primary current injection. Ground-fault pickup values must be as specified, and the trip characteristic must not exceed manufacturer's published time-current tolerance band.

f. Determine instantaneous pickup value by primary current injection. Instantaneous pickup values must be as specified and within manufacturer's published tolerances. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.8.

g. Test functions of the trip unit by means of secondary injection. Pickup values and trip characteristic must be as specified and within manufacturer's published tolerances.

h. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils must conform to the manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.20.

i. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.

j. Verify correct operation of auxiliary features, such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free operation, antipump function, and trip unit battery condition. Reset trip logs and indicators. Auxiliary features must operate in accordance with manufacturer's published data.

k. Verify operation of charging mechanism. The charging mechanism must operate in accordance with manufacturer's published data.

J. Insulated-Case/Molded-Case Air-Circuit-Breaker Field Tests:

1. Visual and Mechanical Inspection:
   a. Inspect physical and mechanical condition.
   b. Inspect anchorage and alignment.
   c. Verify the unit is clean.
   d. Operate the circuit breaker to ensure smooth operation.
   e. Inspect operating mechanism, contacts, and arc chutes in unsealed units.
   f. Perform adjustments for final protective-device settings in accordance with the coordination study. Set the protective devices in accordance with results in Section 26 0573.16 "Coordination Studies" and in Section 26 0573.19 "Arc-Flash Hazard Analysis."
2. Electrical Tests:
   a. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to ground with the circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Insulation-resistance values must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1.

Values of insulation resistance less than this table or manufacturer's recommendations must be investigated.

b. Perform a contact/pole-resistance test. Microhm or dc millivolt drop values must not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's published data is not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.

c. Determine long-time pickup and delay by primary current injection. Ground-fault pickup values must be as specified, and the trip characteristic must not exceed manufacturer's published time-current tolerance band, including adjustment factors.

d. Determine short-time pickup and delay by primary current injection. Short-time pickup values must be as specified, and the trip characteristic must not exceed manufacturer's published time-current tolerance band.

e. Determine ground-fault pickup and time delay by primary current injection. Ground-fault pickup values must be as specified, and the trip characteristic must not exceed manufacturer's published time-current tolerance band.

f. Determine instantaneous pickup by primary current injection. Instantaneous pickup values must be as specified and within manufacturer's published tolerances. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.8.

g. Test functions of the trip unit by means of secondary injection. Pickup values and trip characteristic must be as specified and within manufacturer's published tolerances.

h. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils must conform to the manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.20.

i. Verify correct operation of auxiliary features, such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free operation, anti-pump function, and trip unit battery condition. Reset trip logs and indicators. Auxiliary features must operate in accordance with manufacturer's published data.

j. Verify operation of charging mechanism. The charging mechanism must operate in accordance with manufacturer's published data.

K. Low-Voltage Ground-Fault Protection System Field Tests:

1. Visual and Mechanical Inspection:

a. Inspect the components for damage and errors in polarity or conductor routing.

1) Verify that ground connection is made on the source side of the neutral disconnect link and on the source side of ground-fault sensor.

2) Verify that the neutral sensors are connected with correct polarity on both primary and secondary.

3) Verify that phase conductors and the neutral pass through the sensor in the same direction for zero sequence systems.

4) Verify that grounding conductors do not pass through zero sequence sensors.

5) Verify that grounded conductor is solidly grounded.

b. Verify the unit is clean.

c. Operate the circuit breaker to ensure smooth operation.
d. Verify correct operation of functions of the self-test panel if provided.
e. Verify that the control power transformer has adequate capacity for the system.
f. Set pickup and time-delay settings in accordance with "Quality Control" Article. Record appropriate operation and test sequences in accordance with NFPA 70, Article 230, Section 23 0.95 "Ground-Fault Protection of Equipment."

2. Electrical Tests:
a. Measure the system neutral-to-ground insulation resistance with the neutral disconnect link temporarily removed. Replace the neutral disconnect link after testing. System neutral-to-ground insulation resistance must be a minimum of 1 megohm. Correct wiring until the minimum is achieved.
b. Perform ground-fault protective-device pickup tests using primary injection. Results of pickup test must be greater than 90 percent of the ground-fault protective-device pickup setting and less than 1200 A or 125 percent of the pickup setting, whichever is smaller. Adjust or replace the device until these parameters are achieved.
c. For summation-type systems utilizing phase and neutral current transformers, verify correct polarities by applying current to each phase-neutral current-transformer pair. This test also applies to MCCBs utilizing an external neutral current transformer. The ground-fault protective device must operate when current direction is the same relative to polarity marks in the two current transformers. The ground-fault protective device must not operate when current direction is opposite relative to polarity marks in the two current transformers.
d. Measure time delay of the ground-fault protective device at a value equal to or greater than 150 percent of the pickup value. Relay timing must be in accordance with manufacturer's published data but must be no longer than one second at 3000 A in accordance with NFPA 70, Article 230, Section 23 0.95 "Ground-Fault Protection of Equipment."
e. Verify reduced control voltage tripping capability is 55 percent for ac systems and 80 percent for dc systems. Replace the ground-fault system if the reduced control voltage tripping requirement is not achieved, and retest.
f. Verify blocking capability of zone interlock systems. Results of zone-blocking tests must be in accordance with manufacturer's published data and design specifications.

L. Metering Device Field Tests:
1. Visual and Mechanical Inspection:
a. Inspect physical and mechanical condition.
b. Inspect cover gasket, cover glass, condition of spiral spring, disk clearance, contacts, and case shorting contacts, as applicable.
c. Verify the unit is clean.
d. Verify freedom of movement, end play, and alignment of rotating disk(s).
2. Electrical Tests:
a. Verify accuracy of meters at cardinal points. Meter accuracy must be in accordance with manufacturer's published data.
b. Calibrate meters in accordance with manufacturer's published data. Calibration results must be within manufacturer's published tolerances.

c. Verify instrument multipliers. Instrument multipliers must be in accordance with system design specifications.
d. Verify that current-transformer and voltage-transformer secondary circuits are intact. Test results must confirm the integrity of the secondary circuits of current and voltage transformers.

M. Nonconforming Work:
1. Equipment and devices will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

N. Prepare test and inspection reports. Record as-left set points of adjustable devices.

3.07 FOLLOW-UP SERVICE

A. Voltage Monitoring and Adjusting: After Substantial Completion, if requested by Owner, but not more than six months after Final Acceptance, perform the following voltage monitoring:
1. During a period of normal load cycles as evaluated by Owner, perform seven days of three-phase voltage recording at the outgoing section of each secondary unit substation. Use voltmeters with calibration traceable to the National Institute of Science and Technology standards and with a chart speed of not less than 1 inch per hour. Voltage unbalance greater than 1 percent between phases, or deviation of phase voltage from the nominal value by more than plus or minus 5 percent during the test period, is unacceptable.
2. Corrective Action: If test results are unacceptable, perform the following corrective action, as appropriate:
a. Adjust transformer taps.
b. Rebalance loads.
c. Prepare written request for voltage adjustment by electric utility.
3. Retests: Repeat monitoring, after corrective action has been performed, until satisfactory results are obtained.
4. Report:
a. Prepare a written report covering monitoring performed and corrective action taken.
b. For each relay and adjustable circuit breaker, tag the device with adjusting technician's initials and the date of the adjustment. Record the settings and file with test records specified in "Field Quality Control" Article.

B. Infrared Inspection: Perform the survey during periods of maximum possible loading. Remove covers prior to the inspection.
1. After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared inspection of the electrical power connections of the unit substation.
2. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switchgear 11 months after date of Substantial Completion.
3. Instrument: Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1 deg C at 30 deg C.
4. Record of Infrared Inspection: Prepare a certified report that identifies the testing technician and equipment used, and lists the results as follows:
a. Description of equipment to be tested.

b. Discrepancies.
c. Temperature difference between the area of concern and the reference area.
d. Probable cause of temperature difference.
e. Areas inspected. Identify inaccessible and unobservable areas and equipment.
f. Identify load conditions at time of inspection.
g. Provide photographs and thermograms of the deficient area.

5. Act on inspection results in accordance with the recommendations of NETA ATS, Table 100.18. Correct possible and probable deficiencies as soon as Owner's operations permit. Retest until deficiencies are corrected.

END OF SECTION

SECTION 31 23 00

EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes (but Is Not Necessarily Limited to):
   1. Rough grading earthwork.
   2. Excavating, trenching, and backfill.

2

1.02 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe or conduit in a trench, including haunches to support sides of pipe or conduit.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed between the subbase course and asphalt paving

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

F. Engineered Fill: Fill material placed at the direction of the soils engineer.

G. Excavation: Removal of material encountered above subgrade elevations.
   1. Additional Excavation: Excavation below subgrade elevations as directed by College Project Manager. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
   2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.
   3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by College Project Manager. Unauthorized excavation, as well as remedial work directed by College Project Manager, shall be without additional compensation.

H. Fill: Soil materials used to raise existing grades.

I. Rock (project definition): Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering or ripping, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-wide, short-tip-radius rock bucket; rated at not less than 120-hp flywheel power with bucket-curling force of not less than 25,000 lbf and stick-crowd force of not less than 18,700 lbf; measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 45,000-lbf breakout force; measured according to SAE J-732.

J. Rock (ASTM definition): Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that when tested by an independent geotechnical testing agency, according to ASTM D 1586, exceeds a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm).

K. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

L. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

M. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

N. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. General Provisions Section – Testing and Inspection

B. Section 31 23 33 – Trenching, Backfilling and Compaction.

C. Section 33 05 00 - Installation of Buried Pipe.

D. Section 33 41 00 – Subdrainage.

1.04 SUBMITTALS

A. Product Data: For the following:
1. Drainage fabric.
2. Separation fabric.

B. Samples: For the following:
1. 10-lb. samples, sealed in airtight containers, of each proposed soil material from on-site or off-site borrow sources. This does not include District stockpile.
2. 12-by-12-inch sample of drainage fabric.
3. 12-by-12-inch sample of separation fabric.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance with the following requirements:
   1. Classification according to ASTM D 2487 of each on-site or off-site borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 1557 for each on-site or off-site borrow soil material proposed for fill and backfill.
   3. Laboratory compaction curve according to ASTM D 1557 for each on-site or off-site borrow soil material proposed for fill and backfill.

D. Blasting will not be permitted.

1.05 REFERENCES

A. Standard Specifications for Public Works Construction ("Greenbook"), most current edition.

1.06 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

1.07 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving existing facilities unless permitted in writing by College Project Manager and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify College Project Manager not less than two weeks in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without College Project Manager's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.

B. Cooperate with District and utility companies in maintaining respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

C. Demolish and completely remove from site existing underground utilities to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations on District's stockpile.

B. Satisfactory Soils: Refer to Standard Specifications for Public Works Construction (SSPWC) "Greenbook" for recommendations.

C. Unsatisfactory Soils: Refer to Standard Specifications for Public Works Construction (SSPWC) “Greenbook” for recommendations. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Backfill and Fill: Satisfactory soil materials.

E. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; with at least 90 percent passing a 1-1/2- inch sieve and not more than 12 percent passing a No. 200 sieve. Must meet Caltrans standards.

F. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve for Class II Base.

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve. Must meet Caltrans standards.

H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

I. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No. 8 sieve.

J. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.02 DRAINAGE FABRIC

A. Non-woven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods.
   1. Grab Tensile Strength: 120 lbf; ASTM D 4632.
   2. Tear Strength: 40 lbf; ASTM D 4533.
   3. Puncture Resistance: 50 lbf; ASTM D 4833.
   4. Water Flow Rate: 150 gpm per sq. ft.; ASTM D 4491.
   5. Apparent Opening Size: No. 50; ASTM D 4751.

2.03 SEPARATION FABRIC

A. Woven geotextile, specifically manufactured for use as a separation geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods.

1. Grab Tensile Strength: 200 lbf; ASTM D 4632.
2. Tear Strength: 75 lbf; ASTM D 4533.
3. Puncture Resistance: 90 lbf; ASTM D 4833.
4. Water Flow Rate: 4 gpm per sq. ft.; ASTM D 4491.
5. Apparent Opening Size: No. 30; ASTM D 4751.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.02 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
   2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.03 EXPLOSIVES

A. Explosives: Do not use explosives.

3.04 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

B. Classified Excavation: Excavation to subgrade elevations classified as earth and rock.
   1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed;

together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
   a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
2. Rock excavation includes removal and disposal of rock.
   a. Do not excavate rock until it has been classified and cross-sectioned by College Project Manager.

3.05 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavation for Mechanical or Electrical Utility Structures: Excavate to required elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended for bearing surface.

3.06 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to required cross sections, elevations, and grades.

B. Excavations shall be in accordance with the Standard Specifications for Public Works Construction (SSPWC) “Greenbook” prepared for this Project.

3.07 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to required gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of pipe a minimum of 36” below finished grade to top of pipe.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise required to meet minimum cover.
   1. Clearance: unless otherwise shown on the drawings, 12 inches on each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
   1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
   2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
   3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Depth: Excavate trenches 6 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
   1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.08 APPROVAL OF SUBGRADE

A. Notify College Project Manager when excavations have reached required subgrade.

B. If College Project Manager determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
   1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.

D. Reconstruct subgrades damaged by rain, accumulated water, or construction activities, as directed by College Project Manager.

3.09 UNAUTHORIZED EXCAVATION

A. Intentionally left blank.

B. Fill unauthorized excavations under other construction or utility pipe as directed by College Project Manager.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations a minimum distance equal to the depth of excavation. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, damp proofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for record documents.
   3. Inspecting and testing underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring and bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Provide 4-inch thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

D. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.
   1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

E. Coordinate backfilling with utilities testing.

F. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

G. Place and compact final backfill of satisfactory soil material to final subgrade.

H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.
   3. Under steps and ramps, use engineered fill.
   4. Under building slabs, use engineered fill.
   5. Under footings and foundations, use engineered fill.

3.14 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill material on surfaces that are muddy, or contain frost or ice.

2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Unless otherwise specified on the drawings or in the soils report, compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
   1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
   2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 95 percent.
   3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 90 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
   3. Stripping. When fills are to be constructed over cultivated or fallowed land, the entire area upon which the fill is to be constructed shall first be cleared of vegetation and then smoothed with a blade grader. When fills are to be constructed over sodded surfaces, the sod shall be stripped to a depth of 2 inches. These smoothed or stripped surfaces shall then be rolled to the specified density required for fill prior to the fill material placement. Dispose of stripped material as waste and completely remove from the Project site.
   4. Conservation of Topsoil. Deposit topsoil in storage piles convenient to the areas which are subsequently to receive application of topsoil. Stockpile topsoil free of roots, stones and other undesirable material as specified in Paragraph 2.1 B above. Keep topsoil, when stored, separate from other excavated materials. Cover storage piles as required to prevent wind blown dust.
   5. Fills. Construct fills at the locations and to the lines and grades indicated on the Drawings. Insure that the completed fill corresponds to the shape of the typical sections shown on the Drawings or meets the requirements of that particular case. Use all approved material removed form the excavation in forming the necessary fill. All fill material shall be free from logs, stumps, sod, weeds, trash or other perishable material, and from all stones having a maximum dimension greater than 6 inches. No stones shall be permitted in the top 12 inches of fills. Place the

material in successive horizontal layers not exceeding 8 inches in loose depth. Use a blade grader to keep fill material spread uniformly. Remove any soft sections, holes or depressions to required grades and refill with material as approved, and shape the entire area to line, grade, and cross section and thoroughly compact as specified. Contractor is responsible for adjustment of the moisture content of the fill material so that the specified compaction can be obtained. The rough grade for the entire Project site or portion thereof shall be approved by College Project Manager before placement of any topsoil.

a. Subgrade Preparation. Subgrades for all drives, parking areas, sidewalks and other structures shall be shaped, dressed, moistened and compacted as specified Test the subgrade for crown, elevation and density in advance of placing pavement.

b. Spreading of Topsoil:. Upon completion of rough grading, spread the stockpiled topsoil for a uniform depth of 6 inches, after settlement, over all areas graded not receiving other surfacing, just prior to the sodding or landscaping operation. Before spreading the topsoil, scarify the graded areas for a depth of 3 inches and repair all settlements and washes.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Finished Grading. Accomplish uniformly smooth grading of all areas covered within the limits of the work, including excavated and filled sections and adjacent transition areas so that the finished surface is smooth, compacted and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from blade-grader operations except as otherwise specified. Finish all swales so as to drain readily.

1. Backfill material shall be the same as specified for fill and shall be placed and compacted as specified for fill unless otherwise noted.

D. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot (3-m) straightedge.

3.17 SUBSURFACE DRAINAGE

A. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6-inch course of filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 12 inches of filter material and wrap in drainage fabric, overlapping sides and ends at least 6 inches.

1. Compact each course of filter material to 90 percent of maximum dry unit weight according to ASTM D 1557.

B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches.

1. Compact each course of filter material to 90 percent of maximum dry density according to ASTM D 1557.
2. Place and compact impervious fill material over drainage backfill to final subgrade.

3.18 BASE COURSES

A. Under pavements and walks, place base course on prepared subgrade and as follows:
   1. Place base course material over subgrade.
   2. Compact base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 90 percent of maximum dry unit weight according to ASTM D 1557.
   3. Shape base to required crown elevations and cross-slope grades.
   4. When thickness of compacted base course is 6 inches or less, place materials in a single layer.
   5. When thickness of compacted base course exceeds 6 inches, place materials in equal layers, with no layer more than 8 inches thick loose material or less than 4 inches thick when compacted.

3.19 DRAINAGE COURSE

A. Under slabs-on-grade, install drainage fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.

B. Under slabs-on-grade, place drainage course on prepared subgrade and as follows, unless otherwise specified by the Geotechnical Engineer:
   1. Compact drainage course to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
   2. When compacted thickness of drainage course is 6 inches or less, place materials in a single layer.
   3. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.20 FIELD QUALITY CONTROL

A. Testing Agency: District will furnish a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design-bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by College Project Manager.

D. Testing agency will test compaction of soils in place according to ASTM D 1556 and ASTM D 2922 as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.

2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by College Project Manager; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

2

A. Transport surplus soil off-site to approved disposal location.

END OF SECTION

SECTION 31 23 33

TRENCHING, BACKFILLING AND COMPACTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall comply with the requirement of this section which includes materials, testing and performance of trench excavation, backfilling and compacting, complete.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 330500 – Installation of Buried Pipe.

B. Section 312300 – Earthwork.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC) “Greenbook” most current edition.

1.04 SUBMITTALS

A. Submit drawings showing excavation and shoring, bracing, or sloping for worker protection in accordance with the Special Provisions Section if required.

B. Submit six (6) copies of a report from a testing laboratory verifying that material conforms to the specified gradations or characteristics for granular material or imported sand.

PART 2 - MATERIALS

2

2.01 PAVEMENT ZONES

A. The pavement zone includes the asphaltic concrete and aggregate base pavement section placed over the trench backfill.

2.02 TRENCH ZONE

A. The trench zone includes the portion of the trench from the top of the pipe zone to the bottom of the street zone in paved areas or to the existing surface in unpaved areas.

2.03 PIPE ZONE

A. The pipe zone shall include the full width of trench from the bottom of the pipe or conduit to a horizontal level above the top of the pipe, as specified below. Where multiple pipes or conduits are placed in the same trench, the pipe zone shall extend from the bottom of the lowest pipes to a horizontal level above the top of the highest or topmost pipe. Thickness of pipe zone above the highest top of pipe shall be 12 inches.

2.04 PIPE BASE

A. The pipe base shall be defined as a layer of material immediately below the bottom of the pipe or conduit and extending over the full trench width in which the pipe is bedded. Thickness of pipe base shall be four inches (4") below the lowest point of the pipe or bell.

2.05 SAND-CEMENT SLURRY BACKFILL

A. Sand-Cement slurry shall consist of one (1) sack of Portland cement per cubic yard of sand and sufficient moisture for workability.

2.06 BACKFILL-PIPE ZONE AND PIPE BASE

A. For ductile iron and PVC pipe the pipe base and pipe zone backfill material shall be imported sand as specified herein.

2.07 IMPORTED OR NATIVE SAND--PIPE ZONE AND PIPE BASE

A. Imported sand shall have a minimum sand equivalent of 30 per State of California, Division of Highways Test "California 217" with 100% passing a 3/8" sieve and not more than 20% passing a 200-mesh sieve.

B. Imported sand used in the pipe zone or for the pipe base shall have the following gradation:

Sieve Size	Percent passing by Weight
3/8 inch	100
No. 4	75 - 100
No. 30	12 - 50
No. 100	5 - 20
No. 200	0 - 15

2.08 SAND-CEMENT SLURRY REFILL MATERIAL FOR FOUNDATION STABILIZATION IN PIPE ZONE

A. Sand-Cement slurry fill in the pipe zone shall not be used unless approved by the College Project Manager.

B. Sand-Cement slurry shall consist of one (1) sack of Portland cement per cubic yard of sand and sufficient moisture for workability.

2.09 WATER FOR COMPACTION

A. Water used in compaction shall have a maximum chloride concentration of 500 mg/l, a maximum sulfate concentration of 500 mg/l, and shall have a pH of 7.0 to 9.0. Water shall be free of acid, alkali or organic materials injurious to the pipe coatings.

PART 3 - EXECUTION

3.01 TESTING FOR COMPACTION

A. Unless otherwise directed by the College Project Manager or the District, the Contractor will test for compaction as described below.

B. Determine the density of soil in place by the sand cone method, ASTM D 1556.

C. Determine the laboratory moisture-density relations of soils per ASTM D 1557.

D. Determine the relative density of cohesionless soils by ASTM D 2049.

E. Sample backfill materials by ASTM D 75.

F. Express "relative compaction" as the ratio, expressed as a percentage; of the in place dry density to the laboratory maximum dry density.

G. Compaction shall be deemed to comply with the specifications when no test falls below the specified relative compaction. The Contractor shall pay all associated costs of any re-testing of work not conforming to the specifications.

3.02 COMPACTION REQUIREMENTS

A. Unless otherwise shown on the Drawings or specified in the soils report relative compaction in pipe zone shall be 95 percent.

3.03 MATERIAL REPLACEMENT

A. Remove and replace any trenching and backfilling material, which does not meet the specifications, at the Contractor's expense.

3.04 SHEETING, SHORING AND BRACING OF TRENCHES (IF REQUIRED)

A. GENERAL

1. Trenches shall have sheeting, shoring and bracing conforming to CAL/OSHA requirements and General Provisions. Lateral pressures for design of trench sheeting, shoring and bracing shall be based on type of soil exposed in the trench, groundwater conditions, surcharge loads adjacent to the trench and type of shoring that will be used in the trench.
2. The banks of trenches, where required to control trench width and protect adjacent structures, shall be sheeted and braced at no additional expense to the Owner. Where shoring, sheeting, bracing or steel strutted trench boxes are necessary, they shall be furnished, placed, maintained and, except as shown or specified otherwise, removed. Where damage is liable to result from the removal of the sheeting, then the sheeting will be required to be left in place and cut off if required or directed.
3. The design, planning, installation and removal, if required, of steel strutted trench boxes or sheeting, shoring, lagging, and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soils below and adjacent to the excavation.

4. The use of horizontal strutting below the barrel of the pipe or the use of the pipe as support for trench bracing will not be permitted. Sheet piling and timbers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loading which might overload the pipe.
5. Following removal of shoring, bracing or steel strutted trench boxes, the space left due to such removal shall be backfilled immediately and the backfill compacted.

3.05 TRENCH EXCAVATION

A. GENERAL
1. Excavation of every description and of whatever substance encountered shall be performed, to the depths required. It may be necessary to increase or decrease the quantity of excavation because of unknown factors. The Engineer reserves the right to change the trench alignment from that indicated by 10 feet horizontally without additional expense to the Owner.

B. TRENCH WIDTHS
1. Maximum trench width in the pipe zone shall be as indicated on the plans. Trench width at the top of the trench will not be limited except where width of excavation would undercut adjacent structures and footings. In such case, width of trench shall be such that there is at least 18 inches between the top edge of the trench and the structure or footing.

C. GRADE
1. Excavate the trench to the depth required with allowance for pipe thickness and for pipe base or special bedding. If the trench is inadvertently excavated below the required grade, refill with imported sand any part of the trench excavated below the grade at no additional cost to the Owner. Place the refilling material over the full width of trench in compacted layers not exceeding six inches (6") to the established grade with allowance for the pipe base or special bedding.

D. EXCAVATION
1. Unless otherwise indicated, excavation shall be open cut. During excavation, material shall be stockpiled in an orderly manner, a distance back from the edges of the excavations specified by the governing safety agency before being wasted as specified. Caution shall be exercised in operating heavy equipment over pipelines. Leaks or breaks caused by the Contractor's operations shall immediately be repaired at no additional expense to the Owner and in a manner acceptable to the Engineer. The banks of excavated areas shall be controlled as is necessary to prevent movement of soil in areas supporting existing foundations, slabs, pole lines, underground power or telephone cables, trees, pipelines or other structures. If, as a result of the excavation or through fault or neglect of the Contractor, the earth or ground under or around such foundations, slabs, pole lines, underground power or telephone cables, trees, pipelines or other structures, slips or is otherwise disturbed, corrective measures shall be taken as directed at no additional expense to the Owner.
2. In the event the maximum allowable trench width is exceeded, the Contractor may be required, depending on the depth of trench, to improve the pipe bedding by utilizing concrete or other bedding materials as necessary to assure that the type

of pipe installed can withstand the loads imposed by the backfill due to the depth of the trench.

3. The bottom of the trench shall be excavated to the depth required with proper allowance for pipe thickness, and for foundation stabilization and special bedding when required. Material containing rocks or cobbles larger than 2 inches in maximum dimension shall not be permitted within 6 inches of the pipe. Material of this type shall be removed from the bottom of the trench and replaced with backfill material. Parts of the trench excavated below grade shall be corrected with backfill as specified. The depth of trenches shall be as indicated.

3.06 DEWATERING

A. Provide and maintain means and devices to remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipe-laying, during the laying of the pipe, and until the backfill at the pipe zone has been completed. These provisions shall apply during 24 hours per day, seven days a week. Dispose of the water in a manner to prevent damage to adjacent property. Do not drain trench water through the pipeline under construction. Do not allow groundwater to rise around the pipe until jointing compound has set hard.

B. Contractor shall notify the College Project Manager 48 hours prior to commencement of dewatering.

3.07 LOCATION OF EXCAVATED MATERIAL

A. During trench excavation, place the excavated material only within the working area. Do not obstruct any roadways or streets. Conform to federal, state and local regulations governing the safe loading of trenches with excavated material.

3.08 TRENCH BACKFILLING

A. Backfill per the detailed piping specification for the pipe and per the following.

B. Place the specified thickness of pipe base material over the full width of trench. Grade the top of the pipe base ahead of the pipe-laying to provide firm, uniform support along the full length of pipe.

C. After pipe has been bedded, place pipe zone material simultaneously on both sides of the pipe, keeping the level of backfill the same on each side. Carefully place the material around the pipe so that the pipe barrel is completely supported and that no voids or uncompacted areas are left beneath the pipe. Use particular care in placing material on the underside of the pipe to prevent lateral movement during subsequent backfilling.

D. No mechanical compaction of material placed within 12 inches of the outer surface of the pipe will be allowed.

E. Push the backfill material carefully onto the backfill previously placed in the pipe zone. Do not permit free fall of the material until at least two feet (2') of cover is provided over the top of the pipe. Do not drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe.

3.09 BACKFILL COMPACTION

A. Compact per the detailed specification.

B. Compact trench backfill to the specified relative compaction. Compact by using mechanical compaction or hand tamping. Consolidation by jetting or flooding will be permitted at the Geotechnical Engineer's discretion. Maximum backfill lifts shall not exceed eight inches (8").

3.10 IMPORT OR EXPORT OF BACKFILL MATERIAL

A. Excess excavation soil material shall be removed and disposed of by the Contractor off the project site at the Contract's expense. Excess soil material shall be disposed of in accordance with local regulations.

B. Contractor shall be responsible, at no additional cost to the Owner, to import any required additional backfill material necessary to return all grades to the grade encountered at the beginning of construction or as shown on the contract Drawings.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCING AND GATES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section includes Chain link fencing and gates as indicated.

B. Related Sections:
1. Section 31 23 33: Trenching, Backfilling, and Compaction
2. Section 32 13 13: Sitework Concrete

1.02 REFERENCE STANDARDS

A. Placeholder

1.03 SUBMITTALS

A. Shop Drawings: 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.

1.04 QUALITY ASSURANCE

A. Comply with Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS

2.01 MATERIALS

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:

1.	Portland Cement	1 part
2.	Fine Aggregate	2 parts
3.	Coarse Aggregate (1/4” to 1-1/2”)	4 parts
4.	Water	7 ½ gallons max. per sack of cement

B. Chain Link Fence Fabric, Posts, Rails, and Gates: Standard galvanized.

C. Chain Link Fence Fabric: Conforming to ASTM A 392, Class C2 zinc coating, 2.00 ounces minimum per square foot of vinyl-coated wire surface, hot-dipped galvanized after weaving, and top and bottom edges knuckled.
1. Fabric for perimeter fencing and interior fencing shall be 9 gauge woven wire; with one (1) inch mesh, unless otherwise specified.

2. Installed fence fabric shall be free from barbs or other projections. Installed fence fabric with such defects will be deemed defective Work

D. Posts, Top Rails, Brace Rails and Gate Frames: Standard weight, galvanized, welded or seamless steel pipe conforming to ASTM A 53, 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.

E. Schedule of Posts and Footings: 2

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
Line Posts	Up to 6'-0"	2	2.375	2.65	See Details	See Details
Terminal, Corner, Angle & Pull Posts	Up to 8'-0"	2-1/2	2.875	5.79	12	36
Pedestrian Gate Posts	Up to 8'-0"	2-1/2	2.875	5.79	See Details	
Gate Frames	Up to 8'-0"	1-1/2	1.900	2.72	N/A	N/A

F. Post Caps: Malleable iron, ASTM A 47, Grade 32510, 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.

G. Eye Tops: Malleable iron, ASTM A 47, Grade 32510, designed to fit over line posts, and for through passage of top rail.

H. Expansion Sleeve Couplings for Top Rails: Steel, six (6) inches long, designed to fit tightly on inside of rail, fitted with raised center.

I. Rail Ends for Top Rails and Brace Rails: Malleable iron, ASTM A 47, Grade 32510, with holes to receive 3/8-inch bolts for securing to rail end bands.

J. Tension Bands and Bands for Securing Rail Ends: Mild steel flats, at least 11 gage x one (1) inch, tension bands in gates shall be 11 gage x one (1) inch. Bolts for use with tension bands and rail end bands shall be 3/8-inch x 1-1/2-inches.

K. Tension Bars: Mild steel flats at least 3/16-inch x ¾-inch.

L. Tension Wire for Installation at Bottom of Fabric: 6 gauge 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.

M. 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 4-1/2-inches of take-up.

N. Tie Wire: Aluminum ties 6 gauge for fastening fabric to posts, top rails and brace rails. At bottom tension wire 9 gauge galvanized hog rings shall be installed.

O. 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 A 47 Standard Specification for Ferritic Malleable Iron Castings.

PART 3 - EXECUTION

3.01 SWING GATES

A. Gates that are part of the accessible route shall meet all the requirements of an accessible door in compliance with CBC 11B-404.

B. Gate Frames: 1 ½ inch diameter steel pipe, welded corners, hot dip galvanized after fabrication.

C. Sizes: As indicated on drawings, minimum width of gates shall not be less than 36” (clearance of opening width shall not be less than 32 inches).

D. Hardware: Heavy-duty, galvanized ferrous metal industrial quality as manufactured by Master-Halco/Anchor Fence Inc., Baltimore, MD. Von Duprin, Adams Rite, Sargent, Trimco or equal as approved and in accordance with Division 01, General Requirements for substitutions.

E. Hinges: Structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180 degrees as indicated on drawings
   1. Latch: Fork type latch capable of retaining gate in closed position, except gates with exit devices (panic hardware); Master-Halco, Series 16000 or approved equal.
   2. Locking: Provide padlock capability on non-pedestrian gates only. Do not install padlock capability on Exit Gates, gates on Path of Travel with Exit Devices and other pedestrian gates.

3.02 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 eight (8) feet apart measured from center to center of posts. 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 five (5) percent or more in grade of fencing, and at the beginning and end of curved fence sections.

D. Install 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 3-1/2-inches; for single leaf gates, net opening shall be gate size plus 2-1/2-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. Provide a transom rail and fabric at top of pedestrian gate openings. Install transom rail six (6) feet – eight (8) inches above high point of grade at gate opening. Ends of transom rails shall be pinned or riveted to rail end fittings with ¼-inch mild steel rivets. Pin or rivet must go through rail and peen. Welding on rail ends is not permitted.

H. Install bottom tension wire a minimum of three (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 (3) times around wire. At turnbuckles, wire through eye and tightly twist end at least three (3) times around wire. Cut tail of bottom wire flush.

I. Install fence fabric on outward facing side of posts. Install fence fabric with top edge projecting above top rail of fence.

J. 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.

K. 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

L. Bands and Ties: Install bands and ties in accordance with following schedule:

1. 15 bands on 16 feet fence	16 ties on 16 feet fence
1. 11 bands on 12 feet fence	12 ties on 12 feet fence
2. 7 bands on 8 feet fence	7 ties on 8 feet fence
3. 6 bands on 6 feet fence	6 ties on 6 feet fence
4. 4 bands on 4 feet fence	4 ties on 4 feet fence

M. Fasten fabric to line posts with wire ties spaced not more than 16-inches apart. Where 6 gauge aluminum ties are furnished, hook the tie at both ends. Installation of hooked ties with links is not permitted.

N. 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 two (2) fabrics are furnished, lap the fabrics one mesh at mid-rail and tie both fabrics with 9 gauge wire or 6 gauge aluminum ties to mid-rails.

O. Grind all field welds smooth, clean off flux and spatter, damaged galvanizing removed, burrs and projections ground off, properly prepared, then heavily coated with “Rust Bullet” as manufactured by Poliflex USA or equal product approved by Owner’s Office of Environmental Health and Safety. Install coating in accordance with written recommendations of manufacturer.

P. 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 three (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 galvanized fabricated parts after welding, or finish weld as specified for field welds

Q. Fencing Adjustments:
   1. Where the finish grade is raised six (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-inch above finish grade.
   2. Where the finished pavement is lowered; six (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-inch above finish grade.
   3. Post footings and fabrics that require readjustment after installation shall be entirely replaced.

R. Provide gates of the sizes indicated on Drawings. Allow clearance on gates of 1-1/2 inches at bottom and one (1) 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.

S. 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.

3.03 FIELD QUALITY CONTROL

A. Completed fencing shall form continuous units between points indicated with required parts, accessories, and fittings provided and installed. Clean all 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.

3.04 CLEANING

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.05 PROTECTION OF FINISHED WORK

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 32 84 00

IRRIGATION

PART 1 - GENERAL

A. Materials, equipment and services required to install complete automatic landscape irrigation system as indicated on Drawings.

B. Irrigation components and design shall comply with current Chaffey College Campus Design Standards.

1.2 REFERENCE

A. ASTM A 126 - Gray Iron Castings For valves, Flanges and Fittings

B. ASTM A 536 – Ductile Iron Castings

C. ASTM B 42 – Seamless Copper Pipe

D. ASTM D 1784 - Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds

E. ASTM D 1785 - PVC Plastic Pipe, Schedules 40, 80, and Class 200

F. ASTM D 2464 - Threaded Poly PVC Plastic Pipe Fittings, Schedule 80

G. ASTM D 2466 - PVC Plastic Pipe Fittings, Schedule 40

H. ASTM D 2564 - Solvent Cements for PVC Plastic Piping Systems

I. ASTM F 437 - Threaded CPVC Plastic Pipe Fittings, Schedule 80

J. ASTM F 438 - Socket-Type CPVC Plastic Pipe Fittings, Schedule 40

K. ASTM F 441 - CPVC Plastic Pipe, Schedules 40 and 80 and Class 200

L. ASTM F 477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe

M. ASTM F 493 - Solvent Cements for CPVC Plastic Pipe and Fittings

N. NEMA 250 - Enclosures for Electrical Equipment

O. NEMA 250 - Enclosures for Electrical Equipment

1.3 SUBMITTALS

A. In accordance with Section 01330 - Administrative Requirements for Submittal Procedures.

B. List of Materials:

1. Submit a complete list of materials prior to commencing work. List of materials shall include the name of manufacturer, model number, and description of each item in-tended for use in the installation.
2. Although manufacturer and other information may differ, the following is a guide to the proper format for submittal:

Item	Description	Manufacturer	Model No.
1)	Rotor Type Popup Sprinkler	Rain Bird	T-Bird Series
2)	Field Satellite	Rain Bird	ESP Series
3)	Manual Gate Valve	Nibco	T-113
4)	Etc.	Etc.	Etc.

3. Irrigation submittal shall be specific and complete. All items shall be listed, including solvent, primer, wire, wire connectors, valve boxes, and other items needed to complete work.
4. Equipment or materials furnished without the prior approval of Owner may be rejected and required to be removed at Contractor’s expense.
5. Approval of any item, alternative, or substitute indicates only that the product or products meet the requirements of Drawings and Specifications based on information submitted.
6. Submit operating and maintenance data of equipment.

C. Project Record Documents: Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1. Provide and keep up to date a complete red-lined record set of drawings (blueline Ozalid type prints) which shall be corrected daily. Prints for this purpose may be obtained from Owner at cost. Document every change from the original Drawings and the exact installed locations, sizes, and types of equipment.
2. Red-lined drawings shall be kept on job site and shall be used only as a record set. The record drawings shall always be available for review by Owner. Submit copies of the red-lined record drawings to Owner for review each month.
3. Red-lined drawings shall serve as record for the progress of work completed and shall be used by the Owner as a basis for measurement and payment. Should record drawings not be available for review or not be up to date at the time of review, it will be assumed no work has been completed.
4. Two weeks prior to date of substantial Completion for work under this Section, transfer all information from the redlined record set of drawings to AutoCAD electronic files. Prepare drawings in accord with Owner's AutoCAD standards. An electronic file of base drawing will be provided by Owner. Provide drawing plot for Owner’s review and approval.
5. As-built locations shall be dimensioned from two permanent points of reference, such as building corners, curbs, hardscape edges, roadways, or similar elements. Offsets should be taken at 90-degree angles from reference points whenever possible.

a. Provide the location of the following items:
   1) Pressure main line routing. Include all changes in direction
   2) Point of connection to the existing water supply lines
   3) Remote control valves
   4) Quick coupling valves and washdown valves
   5) Gate valves (manual and automatic)
   6) Communication and flow sensor cable routing
   7) Flow sensors
   8) Point of connection to electrical power service
   9) Diagrammatic routing of irrigation control wire
   10) Controller location
   11) Irrigation electrical pull box locations
   12) Other related equipment, as directed by Owner

b. Indicate elevations for all components where site conditions require installation deeper than 36 inches.

D. Controller Charts:

1. Submit As-built drawings for review and approval by Owner prior to preparation of controller charts.
2. Provide one controller chart for each field satellite supplied.
3. Controller charts shall be prepared in AutoCAD. Provide hard copy plots of controller charts and AutoCAD electronic files on flash drive. Provide preliminary plot for Owner approval prior to final submittal.
4. The controller chart shall indicate the area controlled by each respective controller and shall be plotted at a scale and size approved by Owner. Chart shall depict each controller station and area of coverage in separate background colors.
5. The controller charts shall be completed and approved prior to the final acceptance of system.

1.4 CONSTRUCTION DRAWINGS

A. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, sleeves, etc. which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of their work and plan their work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, and architectural features.

B. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications. When an item is shown on the plans but not shown on the specifications or vice versa, it shall be deemed to be as shown on both. The Landscape Architect shall have final authority for clarification.

C. The Contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in engineering. Such

obstructions or differences should be brought to the attention of the Landscape Architect as soon as detected. In the event this notification is not performed, the Irrigation Contractor shall assume full responsibility for any revision necessary.

1.5 PROJECT CONDITIONS

A. Coordinate with other trades for underground improvements, location and planting of specimen trees, and other planting as applicable. Verify location of all planting requiring excavations 24 inches in diameter and larger with Owner prior to layout of main lines.

B. Provide temporary irrigation at all times to properly maintain plant materials.

C. Existing Irrigation Systems:

1. The existing computer control system shall be maintained in uninterrupted operation for the duration of the work.
2. All existing irrigation valves and irrigation systems adjacent to the work shall be protected in-place and maintained in operation. Any required disconnection or interruption in existing irrigation shall be coordinated with the Owner in advance of work.

1.6 PRE-INSTALLATION CONFERENCE

A. At least two (2) weeks prior to the commencement of work, Contractor shall arrange a pre-installation conference with the Owner. This meeting shall include all parties responsible for installation, scheduling and testing of the finish work under this section.

B. Review methods and procedures related to the work of this Section, including, but not necessarily limited to the following:

1. Products and system requirements
2. Review of required submittals
3. Review of required details
4. Schedule and sequencing of work
5. Coordination with other trades and existing site conditions
6. Forecasted weather and procedures for coping with unfavorable conditions
7. Required inspections, reviews and procedures for approvals

C. Contractor shall document in writing the conference including all decisions, directions and agreements reached. Furnish copies of record to all parties in attendance.

1.7 COORDINATION

A. Contractor shall give other contractors advance notice to allow them sufficient time to perform their portion of work.

1.8 QUALITY ASSURANCE

A. Coordinate work of this Section with other underground utilities and trades responsible for their installation.

B. Product Handling in accord with Section 01660 – Product Storage and Handling Requirements

C. Worker Qualifications:

1. On-site field superintendent shall have not less than 5 yrs. of continuous experience in the installation of commercial computer-controlled irrigation systems.
2. Documented completion of central control system manufacturer's 'Installation Certification Program for Computer Controlled Irrigation Systems.'
3. Documentation of 5 successfully completed commercial computer-controlled irrigation system installations. Provide project name, location, address, and telephone number of contact person for information regarding the completed work.

D. Tests and Inspections:

1. Do not conceal any work until all required tests and inspections have been completed.
2. Conduct the following tests, inspections and conference with Owner. Provide advanced notification of each according to the times indicated:
   a. Pre-installation conference: 7 days
   b. System layout: 24 hours
   c. Hydrostatic testing of pressure main line and non-pressure lateral lines installed under paving: 24 hours
   d. Coverage tests: 24 hours
   e. Final inspections: 48 hours
3. During final inspection, provide two-way radios and sufficient personnel to provide constant communication between inspection areas and the controller.
4. Hydrostatic Tests:
   a. Furnish force pump and all equipment required to perform hydrostatic testing.
   b. Center load backfill over pipes, leaving all joints exposed until the installation has been inspected, tested, and approved by Owner.
   c. Except for ball valves installed upstream of control valves, all testing shall be completed prior to the installation of all other valves and valve assemblies.
   d. Perform hydrostatic tests in presence of Owner. Maintain 150 psi pressure in the lines for a period of not less than 4 hours. If leaks develop, remake joints and repeat tests until the entire system has proven watertight.
5. Coverage Test:
   a. Upon completion of the sprinkler system and prior to planting of shrubs, ground cover or turf, perform a coverage test in presence of Owner to determine that irrigation coverage for all planting areas is complete and adequate.
   b. Furnish materials and perform work required to correct any inadequacies of coverage. Reschedule and perform additional coverage test with Owner for approval.

E. Final Acceptance

1. Prior to final approval of work, all of the following requirements shall be met:
   a. Landscape irrigation system completed and approved by Owner.
   b. Coverage tests completed and approved by Owner.
   c. Punch list items completed and approved by Owner.
   d. As-built drawings completed and approved by Owner.
2. Maintain irrigation system and sufficient watering schedule until all conditions of approval have been completed.
3. Contracted irrigation maintenance period shall begin upon Owner's final acceptance.

1.9 ADDITIONAL MATERIALS

A. Furnish the following extra system components prior to Final Approval:

1. Six sprinkler bodies of each type used on project.
2. Six sprinkler nozzles of each type used on project.
3. Six pressure compensating nozzle screens of each type used on project.
4. Two wrenches for each type rotor type sprinkler head installed on project.
5. Two valve box keys.
6. One valve key for manual valves.
7. Two quick coupler key assemblies, for every (5) washdown valves installed (or fraction there-of). Key assembly shall include; one Buckner QB7DK15 key, one Nibco T-580 1 in. ball valve, one 1 in. x 2 in. brass nipple, and one Rain Bird SH-1 hose swivel.

1.10 WARRANTY

A. Submit warranty documents as part of project closeout.

B. Warranty the entire landscape irrigation system to give satisfactory service, including all equipment and materials for a period of one (1) year from the date of Final Acceptance.

C. Warranty the temporary landscape irrigation system to give satisfactory service for a period of 6 months from the date of acceptance by Owner.

D. Should any problems develop within the warranty period due to inferior and faulty materials or workmanship, correct problems to Owner's satisfaction at no additional cost.

E. Any damages or re-work required of the landscape or hardscape due to repairs of the irrigation system shall be completed to Owner's satisfaction at no additional cost.

F. Owner reserves the right to make temporary repairs, as necessary, to keep the landscape irrigation system in an operating condition. Exercising this right does not in any way relieve the contractor of any responsibilities under the terms of the warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Plastic Pipe and Fittings:

1. All buried irrigation water pipe, both pressure mainline and lateral lines, shall be purple PVC pipe.
2. Wash-down main lines shall be purple PVC pipe.
3. Pipe shall be marked with Manufacturer's name, nominal pipe size, schedule or class, pressure rating in psi, and date of extrusion.
4. Fittings shall bear manufacturer's name or trademark, material designation, size, and applicable I.P.S. schedule:

    a. Glued socket type, for pipe sizes 3 in. and smaller; Schedule 40, PVC plastic; Grade I, ASTM D2466, Type I
        1) Solvent cement: ASTM D2546, for PVC pipe and fittings.
    b. Threaded type, for pipe sizes 3 in. and smaller; Schedule 80, PVC plastic; threaded type; Grade I, ASTM D2464, and ASTM F437
    c. Bell-end, sizes 4 in. and larger; Ductile iron, grade 70-55-05 in accord with ASTM A536, having deep bell push-on joints with gaskets meeting ASTM F477
        1) Harco ‘Deep Bell’ by the Harrington Corp. of Lynchburg, VA. (804) 845-7094, or Owner-approved equivalent.

B. Copper Pipe and Fittings:

1. Type K, hard tempered pipe, ASTM B42, with solder type fittings.
    a. Solder: ASTM B32, with suitable flux.

C. Brass Pipe Fittings:

1. 125 lb. class cast bronze pipe, ASTM B62, with threaded cast bronze fittings.

D. Thrust Blocks:

1. Standard concrete mix in accord with ASTM C 150, ASTM C 33, and ASTM C 94 with a compressive strength of 2000 psi. after 28 days

E. Valve Boxes:

1. For all valves, boxes to be as specified on drawings, or owner-approved equivalent.

F. Control Wire Requirements:

1. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply lines wherever possible leaving 12 inches between pipes. Wire shall be placed in Schedule 40 PVC gray conduit.
    a. Where wire will not be run in same trench as mainline, install wire in Schedule 40 PVC gray conduit a minimum of 18 in. below finished grade.

2. An expansion curl shall be provided within 3 ft. of each wire connection. Expansion curl shall be of enough length at each splice connection at each electric control valve, so that in case of repair, the valve bonnet may be brought to the surface without disconnecting the control wires. Control wires shall be laid loosely in trench without stress or stretching wire conductors.
3. Conventional Controller:
   a. Make wire splices using 3M DBY-6, DBR-6 connectors, UL-listed. Make an expansion loop of 36 in. at each directional turn.
   b. Use a continuous wire between controller and remote-control valves. Do not use wire splices without prior approval by Owner and/or owner representative. Install each approved splice in valve box.
   c. Color of all common wires shall be white and white with a yellow stripe as noted below. When more than one wire is placed in the same trench each wire shall have a different color. Provide separate common wire for each field satellite supplied.
   d. Color code all control wires as follows:
      1) Common (1) – White
      2) Common (2) -White with Yellow stripe
      3) Spare –Red
      4) Station No. 1 – Black
      5) Station No. 2 – Blue
      6) Station No. 3 – Brown
      7) Station No. 4 – Gray
      8) Station No. 5 – Green
      9) Station No. 6 – Orange
      10) Station No. 7 – Pink
      11) Station No. 8 – Purple
      12) Station No. 9 – Yellow
      13) Station No. 10 – Black with White stripe
      14) Station No. 11 – Blue with White stripe
      15) Station No. 12 – Brown with White stripe
      16) Station No. 13 – Gray with White stripe
      17) Station No. 14 – Green with White stripe
      18) Station No. 15 – Orange with White stripe
      Station No. 21- Gray with Black stripe
      Station No. 22- Green with Black stripe
      Station No. 23- Orange with Black stripe
      Station No. 24- Pink with Black stripe
      Station No. 25- Purple with Black stripe
      Station No. 26- Red with Black stripe
      Station No. 27- Yellow with Black stripe
      Station No. 28- White with Black stripe
      Station No. 29- Black with Red stripe
      Station No. 30- Blue with Red stripe
      Station No. 31- Brown with Red stripe
      Station No. 32- Gray with Red stripe
      Station No. 33- Green with Red stripe
      Station No. 34- Orange with Red stripe
      Station No. 35- Pink with Red stripe

19) Station No. 16 – Pink with White stripe Station No.36-Purple with Red stripe
20) Station No. 17 – Purple with White stripe Station No.37-Yellow with Red stripe
21) Station No. 18 – Red with White stripe Station No. 38- Black with Green stripe
22) Station No. 19 – Blue with Black stripe Station No. 39- Blue with Green stripe
23) Station No. 20 – Brown with Black stripe Station No. 40- Brown with Green stripe

4. 2-Wire Controller:
   a. Use a two-wire path to connect from the controller to a single station or sensor decoder. Each individual remote-control valve, master valve, and flow sensor shall require a decoder compatible with the specified controller.
   b. The decoders may be wired in sequence over any combination of the two-wire paths dependent on the controller capabilities and/or additional expansions models. Each path may extend up to 10,000 ft. to the end of the wire run over 14 AWG wire, or 15,000 ft. over 12 AWG wire.
   c. The wire paths shall be twisted pair, solid-core, color-coded red/blue pairs, enclosed in a PE sleeve. Multiple colors should be used for in-ground identification in areas where multiple 2-wire paths are being ran through the same trench. Hunter Industries Model ID1xxx for 14 AWG conductors, or Model ID2xxx for 12 AWG.
   d. The two-wire paths may be spliced, or “teed”, permitting extensions of the path in multiple directions. In general, the distance from the controller to the end of any one end of a “tee” or wire run shall not exceed the maximum for the gauge of wire, even if the total of all wire exceeds that number. For example, a path comprised of 14 AWG wire, rated for 10,000 ft., could extend 5000 ft. to a “tee” splice, and each arm of the tee could extend an additional 5000 ft. The total wire connected would equal 15,000 ft., but the distance from the controller, to the end of each run, would be 10,000ft. or less, meeting the specification. All wire splices must be made in a valve box with 3M DBR-6 or equal direct-burial waterproof connectors.
   e. Decoder output to solenoid connections shall be made with 3M DBY waterproof, strain-relieving connectors, or exact equals. No substitution of wire or wire connector specifications is permissible. All connections, tees, and splices shall be positioned in valve boxes for future location and service.

G. Sensor Wire

1. The flow sensor wire shall be manufactured by Imperial, model #IFSW. No field splices allowed between flow sensor and controller.

H. Conduit for Wires:

1. All control wires installed under paving shall be installed within a PVC Schedule 40 conduit. Install flow sensor cable and communication cables within a PVC Schedule 40 conduit. Conduit Size as indicated on the Drawings.
2. Use separate conduit for each type of wire or cable

I. Copper Pipe and Fittings:

1. Copper pipe: Type K, hard tempered ASTM B88.
2. Fittings: Wrought copper, solder joint type, in accord with ASTM B828-00.
3. Solder: Make up solder joints with appropriate paste flux and solder with 95/5 solder, unless otherwise specified.

J. Valve Identification Tags:

1. Each electric control valve tag shall include the controller ID and station number.
2. Use one maxi size tag for electric control valve. Each tag shall provide valve ID information.
3. Special order tags from T. Christy Enterprises, 403 West Brenna Lane, Orange, CA 92667. Tel: (714) 771-4142, Fax: (714) 771-3029.

2.2 EQUIPMENT

1. All equipment to be as specified on drawings.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Layout of irrigation pipe and equipment indicated on Drawings is diagrammatic. Actual locations are contingent upon site conditions and integration with other underground utilities.

B. Verify dimensions, grades and points of connection in field prior to commencement of work.

C. Do not proceed with installation when it is apparent that obstructions, grade differences or conflicts in the Drawings exist. Bring all such conflicts or discrepancies are to the immediate attention of Owner for clarification.

D. Obtain and pay all plumbing permits and inspections required by governing agencies.

3.2 TEMPORARY IRRIGATION

A. Provide a temporary irrigation system for all palm trees and all boxed trees 24 in. and larger installed under this contract. This system is to ensure that installed trees will be automatically irrigated during the plant establishment period.

B. The temporary system shall be designed by a qualified irrigation design professional that is experienced with drip and low flow irrigation systems.

1. Submit for Owner approval, prior to commencing with work, schematic drawings showing intended drip irrigation design with all pertinent information for temporary water connections, equipment and installation.

C. System to be installed and operational prior to tree planting, regardless of the availability of a permanent water connection. If permanent irrigation water is not available at the time the system is installed, provide a temporary water connection until a permanent connection can be made.

D. All pipe and tubing for supplemental irrigation shall be buried and sleeved under construction or access roads, at a proper depth to prevent damage. Protect pipe during entire planting process and repair damage to landscape caused by leaking or breakage of lines. Pipe or tubing, not in a hazardous area, can be installed on-grade. Pipe installed as a part of temporary irrigation shall not be re-used as any part of the permanent landscape irrigation system.

E. The system should be designed and installed at 90% capacity in the event additional plant materials or spray stakes are required.

F. Use the following table to determine the required quantity of emitters or spray stakes; all measurements given reflect the longest dimensions

1. 1 spray stake/emitter for all rootballs up to 2 feet
2. 2 spray stakes/emitters for all rootballs up to 4 feet
3. 3 spray stakes/emitters for all rootballs up to 6 feet
4. 4 spray stakes/emitters for all rootballs up to 8 feet

G. Flow rates should be calculated using 0.5 GPM per emitter.

H. Upon completion of the permanent irrigation system, remove battery operated controllers and valves and connect the temporary system to the designated permanent control valves as shown on the Drawings. Battery operated controls to be returned to Owner.

3.3 EXCAVATION AND BACKFILLING

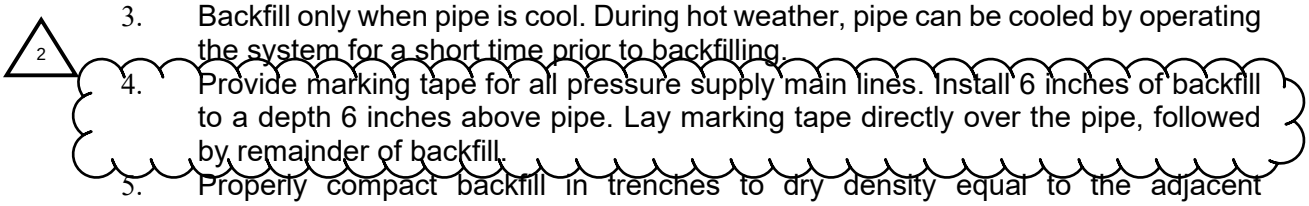
A. Trenching:
1. Lay-out system using an approved staking method.
2. Coordinate routing of mainline piping and trenching with specimen tree locations.
   a. Planting locations shall take precedence over sprinkler and piping locations.
   b. Notify Owner of any major deviations from original layout.
3. Excavate trenches with straight and vertical sides. Provide continuous support for pipe on bottom of trenches. Lay pipe to uniform grade.
   a. Maintain 1 inch minimum clearance between lines which cross at 45-degree to 90 degree angles.
   b. Maintain 6 inch minimum clearance between sprinkler lines and between lines of other trades. Do not install sprinkler lines directly above any another pipes or utilities.
4. Where irrigation lines occur under paving, depth of coverage shall be measured from the bottom of paving material.
   a. Provide minimum cover of 36 inches over all pressure supply main lines 6 in. and larger. Maximum cover shall be 48 inches unless otherwise approved by Owner.

b. Provide minimum cover of 24 inches over all pressure supply main lines 4 inches and larger. Maximum cover shall be 48 inches unless otherwise approved by Owner.
c. Provide minimum cover of 12 inches over non-pressure lateral lines. Maximum cover shall be 18 inches unless otherwise approved by Owner.

5. Install, under mainline, one continuous No. 14 AWG UF tracer wire in all locations where control wires are not installed in same trench as mainline. Tracer wire shall be black with white stripe.

B. Backfilling:

1. Backfill and compaction: In accord with Section 31 23 33.
2. Initial backfill over all pipe shall be clean, fine granular material.
3. Backfill only when pipe is cool. During hot weather, pipe can be cooled by operating the system for a short time prior to backfilling.



4. Provide marking tape for all pressure supply main lines. Install 6 inches of backfill to a depth 6 inches above pipe. Lay marking tape directly over the pipe, followed by remainder of backfill.
5. Properly compact backfill in trenches to dry density equal to the adjacent undisturbed soil, and conform to adjacent grades without dips, sunken areas, humps, or other irregularities.
6. Restore grades and repair any damage where settlement may occur.

3.4 INSTALLATION

A. Point of Connection:

1. Connections to water source shall be at approximate location indicated on Drawings. Make any minor changes caused by actual site conditions without additional cost to Owner.

B. Valve Assemblies:

1. Install and connect all assemblies in accord with Drawings.
2. Do not install multiple assemblies on plastic lines. Provide each assembly with its own outlet. When used, the pressure relief valve shall be the last assembly.
3. All threaded fittings shall be assembled using Teflon tape applied to the male threads.
4. When specified, install backflow assemblies in shrub areas at the minimum height indicated on Drawings.
5. Locations for all equipment, as indicated on Drawings, such as point of connection, CCU's, field satellites and valves are approximate.
   a. Stake out all equipment locations for review and obtain Owner's approval prior to installation.
   b. Minor modifications to layout of equipment shall be provided by at no additional costs to Owner.
   c. Failure to obtain Owner's approval prior to installation may require Contractor to relocate and re-work installation at no additional costs to Owner.

C. Plastic Pipe and Fittings:

1. Install and connect plastic pipe in accord with manufacturer's recommendations.
2. Prepare all welded joints with approved primer prior to applying solvent.
   a. Allow welded joints at least 15 min. set-up/curing time before moving or handling.
   b. Partially center load pipe in trenches to prevent movement or shifting when water pressure is applied.
   c. Do not permit water in pipe for a minimum of 4 hrs. after applying solvent welds.
   d. When the temperature is above 80°F, allow solvent weld joints at least 24 hr. curing time before water is introduced under pressure.
   e. Suspended all solvent welding if air temperature falls below 40°F. Pipe and fittings installed at temperatures below 40°F shall be removed and replaced at no cost to Owner.
3. Installing pipe under existing pavement:
   a. Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. Hydraulic driving will not be permitted under asphalt paving.
   b. Secure permission from Owner prior to cutting or breaking any existing pavement. Repairs or replacement to existing paving shall be approved and completed to the satisfaction of the Owner and shall be installed and finished at no additional cost.

D. Conduit:

1. Install conduit where control wires pass through or under walks, walls and paving. Conduits shall be of adequate size to accommodate retrieval of wires for repair and shall extend 18 in. beyond edges of walls and pavement.

E. Sleeves:

1. Install sleeves for pipes passing through or under walks, walls and paving as indicated on Drawings. Sleeving shall be of adequate size to accommodate retrieval of wiring or piping for repair and shall extend 18 in. beyond edges of paving or other construction.
2. Field verify the location, size and depth of existing sleeves where so noted on Drawings. Notify owner of any discrepancies prior to the start of installation.

F. Wire:

1. Make underground wire connections to electric remote control valves with UL-listed 3M ‘DBY-6’ or ‘DBR-6’ connectors (depending on wire size).
2. Install all control wire in conduit.

G. Gate Valves:

1. Install in accord with Drawings.
2. Check and tighten valve bonnet packing before backfilling.

H. Electric Control Valves:

1. Install in accord with Drawings.
2. Install at sufficient depth to provide not more than 6 in. and not less than 4 in. cover from top of valve to finish grade.
3. Install valves in a plumb position with 24 in. minimum maintenance clearance from other equipment.
4. Electric control valves shall be connected to field satellites in numerical sequence as indicated on Drawings.

I. Quick Coupler Valves/Washdown Valves:

1. Install in accord with Drawings.

J. Sprinkler Heads:

1. Install in a plumb position, perpendicular to finish grade, at intervals not to exceed maximum spacing indicated on drawings.
2. Install heads 1/2 in. above finish grade along curbs, walks, paving, and similar areas.
3. Lay out sprinkler heads and make all minor adjustments required due to differences between site conditions and Drawings. All such deviations in layout shall be within the intent of the original Drawings, and without additional cost to Owner. Routing and layout of all piping shall be approved by Owner prior to installation.
4. After all permanent sprinkler pipe lines and risers are in place and prior to installation of sprinkler nozzles, open control valves and flush out the system with a full head of water.
5. Install nozzles of the required size and pattern for the area of coverage. Install pressure compensating screens per manufacturers recommendations.

K. Field Controller Assemblies:

1. Coordinate with Owner for final controller location.
2. Secure the following services from the controller manufacture:
   a. On-site meeting to review system operation and ensure that all personnel understand system installation techniques.
   b. On-site technical assistance during installation period when requested by Contractor or Owner.
   c. Testing of grounding system.
   d. Hook-up of communication and sensor wires within assemblies.
   e. Continuity and resistance tests on communication wires.
   f. Program decoders.
   g. Verify system flow range and calibrate pulse transmitter.
   h. Test system components for proper operation.
   i. Certification that equipment conforms to and is installed in accord with Drawings, Specifications, and manufacturers' recommendations.

L. Flow Meter and Flow Sensor:

1. Install in accord with manufacturer's instructions and as indicated on Drawings.
2. Provide separate flow sensor cable from each flow sensor to its' respective pulse decoder. Run all cables in PVC Sch 40 conduit.

a. Maximum of three (3) cables from the same point of connection may be installed within the same conduit. Cables from different points of connection are not permitted within the same conduit.
b. Control and common wires for automatic gate valve, upstream of flow sensor, shall be installed within flow sensor cable conduit.

M. Grounding:

1. Grounding Equipment:
   a. Grounding Rods to be 5/8 inch x 10 foot copper clad, UL Listed.
   b. Grounding plates to be 4 inches x 96 inches x 0.06 inch copper alloy with integral connection of 25 feet of #6 AWG bare, solid copper wire, UL Listed conforming to the minimum requirements of Section 250 of the National Electric code. Connection of the wire to plate shall be performed by the plate manufacturer.
   c. Grounding connections to utilize an exothermic welding process, Cadweld connectors, UL Listed, Model GT1161G and straight through couplers.
   d. Grounding wire shall be #6 AWG, solid, bare copper wire.
   e. Ground enhancement material shall be Powerset as manufactured by Loresco, 50 pound bags.
2. Grounding installation:
   a. Each grounding rod shall be driven into the ground its full length 12 feet from the controller and connected via a Cadweld connection to #6 solid, bare copper wire. Additional rods shall be spaced at 20 ft. intervals. The copper wire is to be installed in as straight a line as possible, and if it is necessary to make a turn or bend, it shall be done in a sweeping curve with a minimum radius of 9 inches and a minimum included angle of 90 degrees. There shall be no slices in the bare copper wire. The top of the ground rod shall be driven below the ground surface. A ten inch round valve box shall be placed over the ground rod. A 4 inch grated cover as specified, set a minimum of 1 inch below grade, shall be placed over the grounding plate and a Cadweld connected for periodic maintenance. Cover shall be installed on a minimum of 6 inches of 4 inch ADS corrugated polyethylene, perforated drainage pipe. Plates shall be installed 36 inches below grade with 50 lbs. of Powerset ground enhancement material spread evenly above the plate in accordance with manufacturer's requirements. Plates shall also be covered with a 4 inch grated cover as specified, set a minimum of 1 inch below grade, to facilitate drainage onto the plate. Cover shall be installed on a minimum of 36 inches of 4 inch ADS corrugated polyethylene, perforated drainage pipe.
   b. Multiple controller locations shall have separate grounding for each controller. Grounding rods shall be separated a minimum of 20 feet between grids, plates 3 feet. Grids shall be installed in an irrigated area.

N. High voltage wiring for field satellite:

1. 120V power connection to controllers shall be provided under Division 26 of Specifications. Refer to Division 26 for additional information.
2. All electrical work shall conform to local codes, ordinances, and authorities having jurisdiction.

O. Thrust Blocks:

1. Provide concrete thrust blocks where bell-end ductile iron fittings are installed. Thrust blocks shall be required at all changes in size and direction of bends, reducers, plugs, and the opposite side of "T" intersections. Refer to detail drawings.
2. Thrust block sizes shall be dictated by working pressure, size of pipe, type of fitting and soil conditions. Calculate area required for concrete thrust block in contact with soil. Refer to ductile iron fitting manufacturer's thrust block sizing table to determine sizes for each condition.
3. Allow concrete to cure and complete pressure tests prior to backfilling.

P. Emitter Installation and Operation:

1. Cut emitter tubing using Netafim tubing cutter.
2. Install emitters and/or self-piercing barb connectors in emitter tubing using Rain Bird Bug Gun emitter installation tool.
3. Flush all emitter tubing and PVC lateral lines prior to installation of emitters. Refresh lines after installation of emitters.

3.5 FINAL ADJUSTMENTS

A. Adjust sprinkler heights and vertical alignment, as required, to maintain proper relationship to established grades and planting. Regrade and replant around sprinkler heads as necessary.

B. Fill-in all depressions that arise from possible settlement over trenching or other excavations, with proper soil mix. Compact lightly, and replant as needed to maintain planting design.

C. Adjust nozzles to provide optimum coverage with no overspray to hardscape or building walls.

D. Replace nozzles where required to provide complete coverage.

E. Adjust or relocate moisture sensing equipment, as required, for proper operation.

F. Adjust irrigation schedule and run times to provide adequate water to maintain landscaping.

END OF SECTION 32 84 00

PART 4 - GENERAL

END OF SECTION

SECTION 32 93 00

PLANTING

PART 1 - GENERAL

SECTION 32 93 00 – PLANTING

PART 2 - GENERAL

1.1 SCOPE OF WORK

A. Contractor to furnish all labor, material, equipment, and services required to install all landscape planting, as indicated on the approved drawings and as specified herein, and shall perform all other incidental work necessary to carry out the intent of this specification and drawings including the following:

1. Fine grading, soil preparation, planting of trees, shrubs, vines, ground covers and lawn, guying and staking trees, weed abatement. 90-day Establishment/Maintenance Period.
2. Provide guarantee.

B. All irrigation work shall be approved by the Owner or Landscape Architect prior to any work in this section being performed.

1.2 QUALITY ASSURANCE

A. Nursery Qualifications:

1. Regularly engaged, for the preceding ten years, in the production of planting materials equivalent in species and size to those required.

2. Stocked, and having a demonstrated ability to provide plant materials required within the constraints of the accepted construction schedule.

B. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1. Pesticide Applicator: State licensed, commercial.

C. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1 of the American Standard for Nursery Stock.

D. Pre-installation Conference: Conduct conference at project site with the Landscape Architect, Landscape Contractor, Owner and/or Owner’s Representative.

1.3 BIDDING

A. The amendments, quantities and procedures included herein are for bidding purposes only. Following soil testing by Contractor after rough grading, the amendments, quantities and procedures may change.

B. A minimum of six (6) Agricultural Suitability Soil Tests shall be paid for by the Contractor.

1.4 ANALYSES OF SAMPLES AND TESTS

A. Project Agronomist: Waypoint Analytical : 310-615-0116 or approved equal.

B. Pathology Testing Laboratory (Palms Excluded): Soils and Plant Laboratory: (714) 282-8777; or approved equal.

C. Pathology Testing Laboratory (Palms only for Fusarium): California Seed & Plant Lab: (916) 655-1581.

1.5 AGRONOMIC SOILS REPORT (UNDISTURBED ON GRADE CONDITIONS)

A. The Contractor shall schedule a visit with the Project Agronomist for the purpose of conducting soils analysis from the end of finish grading operations. Soil samples shall be taken by the Project Agronomist from typical tree/shrub locations for analysis by designated soil testing laboratory. Submit soils analysis and recommendations to the Architect for acceptance and re-issue of soil preparation recommendations. Soil analysis shall indicate quantities, chemical properties and recommended manufacturer or supplier. Provide a small scale site plan of testing locations. Soils analysis shall be paid for by the contractor.

1. Methodology: Soil Analysis methodology must include pH measurement in the saturation extract, electrical conductivity of the saturation extract and sodium absorption ratio of the saturation extract. The approved procedures include:
   a. pH Method 21
   b. Saturation extract Method 21
   c. Sodium adsorption ratio Method 20b

2. Approved Methods:
   a. The “American Society of Agronomy” as published in the Methods of Soils`Analysis, “Methods of the United States Salinity Laboratory as published in the Agricultural Handbook Number 60 entitled “Diagnosis and Improvement of Saline and Alkaline soils.”
   b. Base Saturation Methods 18 and 20 of Agricultural Handbook Number 60.
   c. Cation Exchange Capacity – Methods 18 and 20 of Agricultural Handbook Number 60.
   d. Mehlich III texting method is not suitable for alkaline soils and therefore is not an acceptable testing method for Southern California.
   e. The approved methods are those cited by the Council on Soil Testing and Plant Analysis and those methods currently published by Soil Science Society of America Manuals, Communications in Soil Science and Plant Analysis, Soils Science and Soil Science Society of America Journal.

f. Approved methods for phosphorus are Bray P1, Bray P2, Olsen P, DTPA, ammonium acetate and ammonium bicarbonate-DTPA.
g. Approved methods for boron are hot water extract and ammonium bicarbonate-DTPA extract.

B. The following nutrients and elements must be determined with an American Society of Agronomy or Soil Science Society of America approved extraction method. Interpretation data must be given citing concentrations which are considered to be low, medium and high for boron, magnesium, manganese, molybdenum, phosphorus, potassium sodium and sulfur.

C. The saturation extract must be analyzed for calcium, magnesium, sodium, boron, chloride, phosphorus, nitrate and sulfate.

D. The presence of calcium carbonate and/or magnesium carbonate must be determined.

E. The presence of exchangeable ammonium, exchangeable hydrogen, base saturation, exchangeable potassium, calcium, magnesium, and sodium must be determined.

F. Soil Texture: (gravel, sand, silt and clay) and percent gravel must be determined.

G. Determine organic matter content by the measurement of organic carbon. The quality of the organic matter shall be determined by measuring organic carbon and total nitrogen.

H. Interpretation of nutrient deficiencies or excesses and potential toxicities must be determined.

I. Water Infiltration Rate: Method 34b of Agricultural Handbook Number 60.

J. Test results and recommendations shall be approved by the Owner prior to soil preparation to concur with recommendations shown herein.

K. Soil tests shall be performed after soil preparation to confirm that soil preparation was performed in compliance with pre-plant soils report and specifications.

1.6 SUBSTITUTIONS

A. Specific reference to manufacturers' names and products specified in this section are used as standards; this implies no right to substitute other materials or methods without written approval from the Owner.

B. Installation and warranty of any approved substitution shall be Contractor's responsibility. Any changes required for installation or any approved substitution must be made to the satisfaction of the Owner without additional cost to the Owner. Approval by the Owner of substituted equipment and/or dimension drawings does not waive these requirements.

1.7 SUBMITTALS

A. Prior to installation, the Contractor shall submit to the Owner and Landscape Architect two (2) copies of manufacturers' literature, receipts of sale, and laboratory analytical data for the following items:

1. Organic Amendments
2. Soil Conditioner
3. Topsoil (Backfill along Perimeter of Building and Podium Planters)
4. Commercial Fertilizer
5. Mulch
6. Erosion Control Fabric
7. Plant Material

B. Refer to irrigation specifications for additional submittal requirements.

1.8 DELIVERY, STORAGE AND HANDLING

A. Contractor shall furnish standard products in manufacturer's standard containers bearing original labels showing quantity, analysis, and name of manufacturer. All containers, bags, etc., shall remain on site until work is completed.

B. Contractor shall notify Landscape Architect seven (7) days prior to delivery of plant material and submit itemization of plants in each delivery.

C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

D. Handle planting stock by root ball.

E. Where applicable, store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.

F. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

G. Landscape Architect and Owner to review plants upon delivery. Plants that are not healthy or that otherwise do not meet standards will be rejected.

1.9 CLEAN-UP

A. Upon completion of each phase of work under this section, the Contractor shall clean up and remove from the area all unused materials and debris resulting from the performance of the work. The site shall be left in broom-clean condition; wash down all paved areas within the project site and leave walks in a clean and safe condition.

1.10 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
b. Structural failures including plantings falling or blowing over.

2. Warranty Periods from Date of Substantial Completion:

a. Trees, Shrubs, Vines, and Ornamental Grasses 15 gallon and larger: twelve (12) months.
b. Ground Covers, Biennials, Perennials, and Other Plants smaller than 15 gallon: Six (6) months, minimum.
c. Annuals: Two (2) months.

1.11 MAINTENANCE SERVICE

A. Initial Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1) Maintenance Period for Trees and Shrubs: Three (3) months from date of Substantial Completion.
2. Maintenance Period for Ground Cover and Other Plants: Three (3) months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. All plants shall be of the size, variety, age and condition as shown on the drawings and as specified here.

B. Quality - Plants shall be in accordance with the California State Department of Agriculture's regulation for nursery inspections, rules, and grading. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous, and free of insect infestations, plant diseases, sun scales, fresh abrasions of the bark, or other objectionable disfigurements. Tree trunks shall be sturdy and well 'hardened' off. All plants shall have normally well-developed branch structure, and vigorous and fibrous root systems which are not root or pot bound. In the event of disagreement as to condition of root system, the root condition of the plants furnished by the Contractor in containers will be determined by removal or earth from the roots of not less than two (2) plants of each species or variety. Where container grown plants are from several sources, the roots of not less than two (2) plants of each species or variety from each source will be inspected. In case the sample plants inspected are found to be defective, the Landscape Architect reserves the right to reject the entire lot or lots of plants represented by the defective samples.

C. Plants shall be measured when branches are in their normal upright position. Height and spread dimensions specified refer to main body of plant and not branch tip to tip. Caliper measurement shall be taken at a point on the trunk three (3) feet above natural ground line. If a range of size is given, no plant shall be less than the minimum size and not less

than 40 % of the plants shall be as large as the maximum size specified. The measurements specified are the minimum size acceptable and are the measurements after pruning, where pruning is required. Plants that meet the measurements specified, but do not possess a normal balance between height and spread, shall be rejected.

D. Plants shall be nursery grown in accordance with good horticultural practices under climatic conditions similar to those of project for at least two (2) years unless otherwise specifically authorized by the Landscape Architect. All plants shall be heavy, symmetrical, tightly knit, so trained or favored in development and appearance as to be in form, number of branches, compactness and symmetry.

E. All plants shall meet the specifications of federal, state, and county laws requiring inspection for plant diseases and insect control. All inspection certificates required by law shall accompany each shipment, invoice, or order for stock; and when such plants arrive at the site, the certificates shall be delivered to the Landscape Architect.

F. Plants shall be true to species and variety in accordance with the American Association of Nurserymen Standards. Each group of plant materials delivered to the site shall be clearly labeled as to species and variety and nursery source.

G. Plants shall not be pruned before delivery. Trees which have damaged or crooked leaders, or multiple leaders, unless specified, will be rejected. Trees with abrasions of the bark, sun scalds, disfiguring knots, or fresh cuts of limbs over ¾-inch which have not completely callused will be rejected.

H. Plants not conforming to the requirements herein specified will be considered defective and such plants, whether in place or not, will be marked as rejected. Contractor shall immediately remove rejected plans from the premises and replace with new acceptable plants at his expense.

I. There shall be no substitutions of plants or sizes for those listed on the accompanying plans except with the approval of the Landscape Architect.

J. Container stock shall have grown in the containers in which delivered for at least six (6) months, but not over two (2) years. Samples shall show no root-bound conditions. Container plants that have cracked or broken balls of earth when taken from container will be rejected by the Landscape Architect.

K. All boxed trees will require a thorough inspection of the root structure by the Owner/Landscape Architect prior to installation. Only high-quality nursery stock shall be accepted for the project in compliance with the project specifications and the Urban Tree Foundation Guideline Specifications for Nursery Tree Quality (www.urbantree.com).

2.2 TOPSOIL (BACKFILL FOR ON GRADE CONDITION)

A. Topsoil shall be free of roots, clods and stones larger than 1” in the greatest dimension.

B. Imported topsoil shall be from approved locations. Homogenize and remove or break any large clods to less than one (1) inch. Soil samples shall be provided to the Landscape Architect for distribution to Waypoint Analytical for every seven truckloads of topsoil delivered to the site. Samples uld be approved by Wallace Labs prior to trucking and

delivery to the site. Rip sub-grade to depth of 12-inch both ways prior to placing import topsoil. Imported soil placement in six (6) inch lifts and compaction shall not exceed 75%. Perform general soil prep under section 2.4.

Due to on site space restriction around the building, preparation of backfill may need to take place off site prior to trucking the soil back. Contractor is to determine the most efficient and cost-effective option.

C. If top soil imported from outside source, contractor shall notify Owner's representative. Contractor to coordinate with Wallace Labs on soil sample collecting and testing. Contractor to provide location of imported topsoil source for Soils engineer inspection of physical and drainage properties of topsoil.

D. Suitable Soil Criteria:

1. General: Topsoil shall be free of roots, clods and stones larger than 1" in the greatest dimension.
2. Topsoil shall be friable and have sufficient structure in order to give good tilth and aeration to the soil.
3. Gradation limits: ideally, amended soils should be sandy loam or loam. The definition of soil texture shall be the USDA classification scheme. Gravel over two (2) millimeters in diameter shall be less than 20% by weight.
4. Permeability Rate: ideally the hydraulic conductivity rate shall be not less than one (1) inch per hour nor more than 20-inches per hour when tested in accordance with the USDA Handbook Number 60, method 34b or other approved methods.
5. Fertility: the range of the essential elemental concentration in soil shall be as follows:

	Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram dry weight basis
phosphorus	10 - 40
potassium	100 - 220
iron	5 - 35
manganese	0.6 - 6
zinc	1 - 8
copper	0.3 - 5
boron	0.2 - 1
magnesium	50 - 150
sodium	0 - 100
sulfur	25 - 500
molybdenum	0.1 - 2

6. Acidity: the soil pH range measured in the saturation extract (Method 21a, USDA Handbook Number 60) shall be 6.0 - 7.9.
7. Salinity: the salinity range measured in the saturation extract (Method 3a, USDA Handbook Number60) shall be 0.5 - 2.5 dS/m.

8. Chloride: the maximum concentration of soluble chloride in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 150 mg/l (parts per million).
9. Boron: the maximum concentration of soluble boron in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 1 mg/l (parts per million).
10. Sodium Adsorption Ratio (SAR): The maximum SAR shall be three (3) measured per Method 20b, USDA Handbook Number 60.
11. Aluminum: Available aluminum measured with the Ammonium Bicarbonate/DTPA Extraction shall be less than three (3) parts per million.
12. Soil Organic Matter Content: Sufficient soil organic matter shall be present to impart good physical soil properties but not be excessive to cause toxicity or cause excessive reduction in the volume of soil due to decomposition of organic matter. The desirable range is three (3) % to six (6) %. The carbon nitrogen ratio should be about 10. A high carbon: nitrogen ratio can indicate the presence of hydrocarbons or non-humified organic matter.
13. Calcium Carbonate Content: Free calcium carbonate (limestone) shall not be present for acid-loving plants.
14. Heavy Metals: The maximum permissible elemental concentration in the soil shall not exceed the following concentrations:

Ammonium Bicarbonate/DTPA Extraction; parts per million (mg/kilogram) for dry weight basis:

phosphorus	10 - 40
potassium	100 - 220
iron	5 - 35
manganese	0.6 - 6
zinc	1 - 8
copper	0.3 - 5
boron	0.2 - 1
magnesium	50 - 150
sodium	0 - 100
sulfur	25 - 500
molybdenum	0.1 - 2

15. Heavy Metals and Soil pH: If the soil pH is between six (6) and seven (7), the maximum permissible elemental concentration shall be reduced 50%. If the soil pH is less than 6.0, the maximum permissible elemental concentration shall be reduced 75%. No more than three metals shall be present at 50% or more of the above values.
16. Phytotoxic constituent, herbicides, hydrocarbons: Germination and growth of monocots and dicots shall not be restricted more than ten (10) % compared to the reference soil. Total petroleum hydrocarbons shall not exceed 50 mg/kg dry soil measured per the modified EPA Method No. 8015. Total aromatic volatile organic hydrocarbons (benzene, toluene, xylene and ethylbenzene) shall not exceed 0.5 mg/kg dry soil measured per EPA Methods No. 8020.

E. The Contractor shall coordinate with the Landscape Architect and Wallace Labs for soil sample collecting and testing, submit soils analysis, recommendations and topsoil sample to the Landscape Architect for approval. Import topsoil shall not be delivered to the site

prior to Landscape Architect, Owner, Soil Engineer and Wallace Labs approval. The Landscape Architect may request additional testing of imported topsoil at the site to determine conformance to the approved report. Rejected topsoil shall be removed at no cost to the Owner.

F. If stockpiling is requested, locations and amounts of stockpile shall be approved by the Owner.

2.3 SOIL AMENDMENTS AND FERTILIZER FOR ON- SITE TOPSOIL

A. Recommendations:

1. Protect the planter soils from contamination of stucco, paints, welding flux, and other building materials.
2. Remove debris, trash, clods, etc. larger than one (1) inch in diameter.
3. Landscape contractor shall submit soil for test and coordinate with EPTDESIGN and Wallace Labs for soil testing prior to soil preparation.

B. General soil preparation for turf, ground cover and shrub areas:

1. Remove debris, clods, rock, gravel and foreign material larger than one (1) inch in diameter from the top 12- inches. The following amendment rates are per 1,000 square feet and are to be used for estimation during the bid process: Incorporate following homogeneously six (6) inches deep: 3 cubic yards Organic Compost; 5 pounds Ammonium sulfated (21-0-0); 6 pounds Potassium sulfate (0-0-50); 3 pounds Triple superphosphate (0-45-0); 10 pounds Agricultural gypsum; 20 pounds P.A.M. Soil Drain Amendment per manufacturer directions.
2. Cure the soil to activate the soil conditioner. Irrigate the soil to dampen the soil to a depth of six (6) inches. The soil does not need to be saturated, just damp. Allow the soil to dry or, -at least dry to the point where the stringiness has disappeared. Then re-rototill the soil to a six (6) in depth until soil is friable.

C. Preparation of backfill for container plants, boxed trees and augers (including Tree drainage and outside inspection tubes – use backfill in place of crushed rock), homogeneously blend the following materials into excavated soil. Rates are expressed per cubic yard and are to be used estimation during the bid process. Remove debris, clods, rock, gravel and foreign material larger than one (1) inch in diameter.

1. 15% - Organic Compost Amendment.
2. 85% - Native Topsoil (Must be dry and friable prior to mixing with amendments,)
3. 1 pound - Agricultural gypsum.
4. 1/4 pound- Potassium sulfate (0-0-50).
5. 1/4 pound - Ammonium sulfate (21-0-0).
6. 1/4 pound - Triple superphosphate (0-45-0).
7. 2 ounces - P.A.M. Soil Drain Amendment per manufacturer directions.

D. Organic soil amendments:

1. Soil Organic Amendment: The product shall be based upon manure, compost or sludge. Wood residues, sawdust or shavings are not acceptable. The ash content shall be at least 15% and not more than 25%. Sand content shall be less than 2%. The pH shall not be less than 5.0 or more than 7.5. The ECe shall be less than 5.0.
2. Organic Compost: Washed Steer Humus from Earthworks. Telephone: (909) 270-0088; or approved equal. “Forest Floor Humus” from Aguinagua Fertilizer Company. Telephone: (949) 751-9706; or approved equal.

2.4 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

Inorganic Soil Amendments:

1. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   a. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve a minimum of 75 percent passing through No. 60 sieve.
   b. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
2. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
3. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
4. Aluminum Sulfate: Commercial grade, unadulterated.
5. Perlite: Horticultural perlite, soil amendment grade.
6. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.
7. Sand: Clean, washed, natural or manufactured, and free of toxic materials.
8. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
9. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.5 AMENDED SOIL MIX FOR PLANTER POTS

A. Soil to be used as planting medium for all planter pots.

B. Product: LWPS 33 (Light Weight Potting Soil) from Earthworks. Earthworks. Telephone: (951) 538-3321; or approved equal.

C. Provide Mix in sufficient quantities which allow for natural settling and compaction of the mix prior to installing Plant Materials. Mix shall be compacted to 90% density to minimize

settling. Set mix and compact accordingly in six (6) inch lifts, to within two(2) inch of top of the Planting Pot..

2.6 PESTICIDES AND HERBICIDES

A. All chemicals used for weed control shall be registered by the State of California Department of Food and Agriculture and the Environmental Protection Agency with registration identification on the label. Label shall be at job site at all times.

B. All chemicals shall be applied as per registered label instruction and manufacturer's recommendations.

C. Chemicals requiring a licensed applicator must be applied by persons registered with the local county's Department of Agriculture's Commissioner's Office as possessing a current, valid, qualified pest control applicator's license.

D. The use of any restricted materials is forbidden unless a special use permit is obtained from the local county's Department of Agriculture.

E. The herbicide shall be Fucilade for weed grasses and SpeedZone Southern for broadleaf weeds.

F. Do not apply pre-emergent herbicides until plants are established

2.7 SEED

A. Seed shall be of the species and variety specified on the plans. Wet, moldy, or otherwise damaged seed shall not be acceptable.

B. The Contractor shall have all seed to be used on the project officially tested by the California State Department of Agriculture and shall submit to the Landscape Architect prior to hydro- seeding, official seed labels, and a signed statement from the Agriculture Department certifying that the seed meets the analysis shown on the labels. Unlabeled collected seed shall be tested and analyzed and the results furnished in lieu of the seed labels.

C. The seed quantities listed shall be on the basis of pure live seed.

$$\text{Total Seed Material} = \frac{\text{Pounds pure, live seed required}}{\text{Percent purity x percent germination}}$$

2.8 TURF

A. Turf species shall be Bullseye Bermuda, as shown in the Drawings.

B. Soil base shall be sandy loam or loam.

C. Soil base shall be clean topsoil.

D. The following weed seeds are not permissible

1. Quackgrass
2. Johnson grass
3. Nutsedge
4. Poison ivy
5. Canada thistle
6. Poa annua (Annual Bluegrass)

E. Premium grade – not more than one (1) % undesirable grass species or clover. No more than ten (10) weeds per 500 square feet.

F. Commercial grade – not more than ten (10) % undesirable grass species or clover. No more than ten (10) weeds per 500 square feet.

G. Thickness of soil portion of sod should not exceed ½-inch.

2.9 STONE MULCH

A. Crushed Gravel: stone with angular surfaces; gravel size and color as indicated on plans.

2.10 STAKING MATERIALS

2

A. Wood Stakes: Tree stakes shall be straight grained lodge pole pine free of knots, splits, checks, or disfigurements. Stakes shall be three (3) inch minimum nominal size in diameter and 8-feet in length. All lodge pole pine stakes shall have a ten (10) inch tapered driving point and chamfered top and shall be untreated natural wood color, as manufactured by C & E Lumber Company of Pomona, CA. Telephone: (714) 626-3591; or approved equal

B. Supports for wood stakes shall be 32-inch black cinch type; two (2) double cinch ties per tree; V.I.T. Company, Inc. 15561 Product Land, D-4, Huntington Beach, CA. Telephone: (714) 891-8338.

2.11 GUYING MATERIALS

A. Guy wire shall be double stranded 12 gauge galvanized wire.

B. Turnbuckles shall be galvanized or dip-painted and weldless.

C. Cable clamps shall be galvanized or copper, size as required.

D. Guy wire cover shall be PVC ½-inch diameter and shall be six (6) feet in length or provide 90 % cover of guy wire. Apply (2) coats of black paint.

E. Guying collar shall be per V.I.T. The collar shall completely cover the wire and loop around tree limbs. It shall be long enough to permit tree movement within the loop.

F. Anchor to be two (2) inch x two (2) foot length, 15 gauge, galvanized steel pipe. Drill holes as specified to receive wire.

2.12 ROOT CONTROL BARRIERS

A. Root control barriers shall be provided as indicated on the plans, as required in the local governing agency tree planting guideline, and as specified herein.

B. Root control barriers shall be constructed of injection molded copolymer polypropylene with 50% postconsumer recycled plastic and UV inhibitors as manufactured by Deep Root Corp., Westminster, CA, or approved equal.

C. Root control barriers shall be a minimum of 18-inch depth and .08-inch thick when installed adjacent to sidewalk, 36-inch depth and .08-inch thick when installed adjacent to curb.

D. Root control barriers shall be linear.

PART 3 - EXECUTION

1.01 3.1 GENERAL

A. Perform actual planting only during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice.

B. Confirm location and depth of underground utilities and obstructions. If underground structures or utility lines are encountered in the excavation of planting areas, other locations for planting shall be approved by the Landscape Architect.

C. All planting layout and staking shall be accurately made in accordance with the plans. All trees shall be a minimum of three (3) feet from local government agency maintenance limit line.

D. Plant locations shall be approved by the Landscape Architect prior to excavation and may be subject to spacing and distances required by local governing agency standards.

3.2 FINISH GRADING

A. All grading and mounding with the exception of final planting shall be completed prior to soil preparation.

B. Planting areas shall be free of all weeds (plants not specified in planting areas), stones, stumps, roots, or other debris one (1) inch in diameter and greater.

C. Soil shall be graded to a smooth and even surface conforming to required finish grade. Finish grade adjacent to walks, paved areas, curbs, manholes, clean-outs, valve boxes, and similar features shall be one (1) inch below the surface in turf and two (2) inches below in ground cover/shrub areas. Grades between such features shall be carefully sustained and blended to eliminate abrupt changes.

D. Planting areas to receive sod shall sustain a finish grade of such depth that the top of installed sod shall be flush with finish surfaces (walks, paved areas, etc.).

E. Contractor shall allow for soil amendments when establishing sub-grade elevations. All planting areas shall have a finish grade conforming to approved plans and specifications after full settlement has occurred.

F. All planting areas adjacent to buildings shall be graded to drain away from the building at a minimum of two (2) % slope, for a minimum of five (5) feet horizontal distance.

3.3 SOIL PREPARATION

A. Cross-rip soil to a minimum depth of 12-inches. Thoroughly rototill a minimum of two (2) directions the following amendments into the top 12-inches of soil and irrigate thoroughly. (Per 1,000 square feet.) Refer to item 2.4 soil amendment.

B. Planting areas with slopes 2:1 and steeper shall not be soil prepared unless directed by Landscape Architect.

C. Contractor shall not work under muddy conditions.

D. Should 30-calendar days elapse between completion of soil preparation and commencement of planting, all areas shall be prepared again.

3.4 PLANTING OF TREES, SHRUBS, AND VINES

A. Excavation: Planting holes shall have irregular, non-glazed sides, and shall be a minimum of twice the diameter, and 1-½ times the depth of the original plant container.

B. Planting procedure for container grown material:

1. Backfill plant pit with well-tilled on-site soil without amending to the depth of the rootball. Water thoroughly and compact backfill in such a manner so that after settling, the crown of the plant stem is two (2) inches above adjacent grade. Center plant in pit.
2. Uniformly blend amended backfill at a centralized location in minimum one (1) cubic yard lots. Backfill amendments shall be as indicated on the approved agronomic soils report. Mixing in plant pits or beds will not be permitted. Make available for inspection, all delivery slips and analytical data from approved laboratories for specified organic amendments. For bidding purposes use the following mixture:
3. Refer to item 2.4 for backfill amendment. In upper 12-inches of backfill, add a soil blend Nitrogen stabilized organic amendment as recommended on item 2.4. Soil below this depth shall not contain organic amendment.
4. Place slow release fertilizer tablets in upper 18-inches of backfill. Plant tablets shall be required for all tree, shrub and vine plantings. Application rate and nutrients shall be per the manufacture’s recommendation.
5. Backfill remainder of plant pit around the rootball with amended backfill. Firm down, eliminating air pickets. Do not pack. Form a shallow basin around the plant to hold enough water to saturate the rootball and backfill.
6. Immediately after planting, apply water to each tree and shrub by means of a hose. Apply water in a moderate stream in the planting hole until the material about the roots is completely saturated from the bottom of the hole to the top of the ground. Add additional amended backfill material as necessary to correct any settlement around rootball.

D. Sub Drainage: Four (4) inch diameter PVC (SDR-35) perforated for horizontal pipe at bottom of plant pit on each side of rootball, wrapped with filter fabric sock. Vertical clean out should be solid four (4) inch diameter PVC (SDR-35) with NDS black drain grate inserted at finish grade. Connect to civil storm drain where ever possible. If not possible connect to drain sump (six (6) inch diameter auger a minimum of six (6) feet below bottom of plant pit with four (4) inch diameter perforated PVC (SDR-35) and filter fabric sock, backfilled around outside of pipe with the specified clean, washed sand backfill.

3.5 GROUND COVERS

A. Ground cover plants shall not be allowed to dry out before or while being planted. Roots shall not be exposed to the air except while actually being placed in the ground. Wilted plants will not be accepted.

B. Plant ground covers in straight rows evenly spaced, and at intervals required by drawings, use triangular spacing.

C. Plant each rooted plant with its proportionate amount of flat soil. Immediately water after planting until entire area is soaked to full depth of each hole.

D. Protect plants from damage and trampling at all times.

E. In all shrub and groundcover areas, apply minimum three (3) inch layer of Commercial grade shredded hardwood bark mulch, uniform in size, and free of sticks, stones, clods or other foreign material. 0-2" "Forest Floor" from Aguinagua Fertilizer Company. Telephone: (949) 751-9706; or approved equal. Contractor shall submit sample to Landscape Architect for approval.

3.6 TURF

A. General:

1. After soil preparation, establishment of final grades, and weed abatement, carefully smooth all surfaces to be planted, roll area to expose soil depressions or surface irregularities. Re-grade as required. Prior to planting, the soil shall be loose and friable to receive turf.
2. Immediately prior to planting, evenly broadcast a pre-plant commercial fertilizer as recommended in the approved agronomic soils report. Rake in lightly. Avoid planting of turf on dry soil.
3. Turf shall be planted by seeding, hydro-seeding, stolonizing, or sodding as indicated on the plans.

3.7 INSPECTION

A. All inspections herein specified shall be made by the Landscape Architect. The Contractor shall request inspection at least two (2) working days in advance of the time inspection is required.

B. Inspection will be required for the following parts of the work:

1. During the preliminary fine finish grading and soil preparation.
2. When fine finish grading and soil preparation are completed.

3. Plants after delivery to site (prior to planting), when shrubs and trees are spotted for planting,
   but before planting holes are excavated.
4. Specimen trees at source before delivery.
5. Planting areas prior to planting.
6. All landscape construction items, prior to the start of the Maintenance period.
7. Final inspection at the end of the Maintenance period provided that all previous deficiencies have been corrected.

3.8 WATERING

A. Watering of turf to commence immediately after completion of job and to continue at a rate necessary to keep area moist without drying out or puddling. Normally irrigating ONCE AN HOUR for a short duration and continuing this procedure each and every day light hour, seven (7) days a week will be sufficient. This continual moist condition is to prevail each and every day until seeds are well rooted. After the rooting stage is completed, irrigation should still continue on the basis of at least once or twice a day until turf is well established.

B. Immediately after planting, apply water to each tree, shrub and ground cover by means of a hose. Apply water in a moderate stream in the planting hole until the material about the roots is completely saturated from the bottom of the hole to the top of the ground.

C. Water plants which cannot be watered efficiently with the existing water system by means of a hose.

D. Apply water in sufficient quantities, and as often as seasonal conditions require, and keep the ground wet at all times, well below the root system of grass and planting. Do not cause erosion damage in watering slopes.

3.9 LANDSCAPE MAINTENANCE WALK PROTOCOL

A. Interim Maintenance Start (Prior to 90-Day Irrigation Coverage Test): It shall be the responsibility of the General Contractor to establish a meeting to conduct the irrigation coverage test. Attendees shall include the Landscape Architect and Landscape Contractor. The walk shall cover irrigation coverage, functionality and color coated controller charts provided by the Landscape Contractor. A punch list will be generated in preparation for the next site walk. All equipment shall be verified during this meeting.

Pre-Maintenance Walk / Irrigation Coverage Test: It shall be the responsibility of the General Contractor to establish meeting to confirm punch list items are complete. Attendees shall include Landscape Architect, Irrigation Design Consultant, Installing Landscape Contractor, and General Contractor.

The date of the beginning of the ninety (90) day Maintenance period will be established based on the successful completion of the Pre-Maintenance walk. The walk shall cover irrigation coverage, functionality and controller charts provided by the landscape contractor, review of installed plant material, staking, mulch, decomposed granite, gravel, headers, boulders, and all other items within the Landscape Contractor's scope of work.

Remote will be required *(Landscape Contractor's Responsibility)* for all irrigation walks in order to expedite the process. Valves shall be activated from the controller by remote or

use of two-way radios. Manual valve activation is not acceptable prior to 90-day maintenance walk.

If the Pre-Maintenance walk for the irrigation is successful it will be determined at that time when the 90-day Maintenance period will be established.

If the Pre-Maintenance walk for the irrigation is not successful it will be the responsibility of the Landscape Contractor to address the irrigation punch list items prepared by the Landscape Architect. An additional punch walk with the General Contractor, Landscape Architect and Landscape Contractor will be required to check the irrigation corrections prior to establishing a date for the ninety (90) day Maintenance period.

The irrigation punch list shall be provided by the Landscape Architect to the General Contractor, Director Construction and Landscape Contractor within 72 hours. The commencement date of the ninety (90) day Maintenance period shall be provided by the Landscape Architect in a 90–Day Maintenance Letter.

B. 90-Day Final Acceptance: It shall be the responsibility of the General Contractor to establish the 90 Day Maintenance Walk for irrigation. Attendees shall include, General Contractor, Landscape Maintenance Contractor, Landscape Contractor, Landscape Architect and Owner/Representative.

This walk will review the items from the Pre-Maintenance Walk punch list and ensure these items have been completed. Maintenance will start once all items noted on the Pre-Maintenance Walk have been addressed.

C. Final Project Turnover: It shall be the responsibility of the General Contractor to establish the Final Project Turnover date with the, Owner, Landscape Maintenance Contractor, and Landscape Contractor for completion of all phases of construction.

The General Contractor shall document the final acceptance.

One (1) set of the Irrigation “as-built” plans *(30x42 – on bond)* shall be developed by the Landscape Contractor before the final phase acceptance walk. Completed “as-built” shall be submitted to the Landscape Architect for review and approval.

After approval of the Irrigation “as-built” plans the Landscape Contractor shall provide and additional sets as requested by the Owner/Representative.

The installing Landscape Contractor shall include the following items, but not limited to: Controller charts, quick coupler keys, controller operation manuals, special tools required to adjust, install, disassemble, or remove any sprinkler or valves supplied on the project where applicable and other pertinent information at final turnover.

Landscape Contractor shall provide a letter of guarantee for the completed landscape installation to the General Contractor

END OF SECTION 32 93 00

1.02

END OF SECTION

SECTION 33 05 00

INSTALLATION OF BURIED PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes placement of buried pipelines and connections.

1.02 RELATED WORK DESCRIBED ELSEWHERE

A. Section 312333 - Trenching, Backfill and Compaction

1.03 SUBMITTALS

A. Installation schedule.

B. Product data for each type of warning tape. 2

PART 2 - MATERIALS

2.01 PIPE MATERIAL

A. Refer to the section on pipe by type.

2.02 ACCESSORIES

A. Non-Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick.

B. Detectable Warning Tape: Provide an inert polyethylene film detectable warning tape manufactured for marking and identifying underground utilities, 6 inches wide with a minimum metallic foil core of 0.35 mils and shall be reinforced, consisting of 5 mils total thickness.

C. Continuously inscribe warning tape with a description of the utility; colored as follows:
   1. Red: Electric.
   2. Yellow: Gas, and dangerous materials.
   3. Orange: Telephone and other communications.
   4. Blue: Water systems.
   5. Green: Sewer systems.
   6. Purple: Reclaimed Water System

D. Detectable wire
   1. Tracer wire shall be provided when non-detectable warning tape is used for plastic piping. Insulated No. 12 copper tracer wire shall be buried with the pipe and ends brought to surface.

PART 3 - EXECUTION

3.01 DELIVERY AND TEMPORARY STORAGE OF PIPE AT SITE

A. Limit on-site pipe storage to a maximum of one week.

B. Avoid damage to the pipe. If necessary, provide suitable supports.

3.02 HANDLING OF PIPE

A. Lift pipes with handling beams or wide belt slings as recommended by the pipe manufacturer. Do not use cable slings.

3.03 SANITATION OF PIPE INTERIOR

A. During laying operations, do not place tools, clothing or other materials in the pipe.

B. When pipe laying is not in progress, close the ends of the pipe by a vermin-proof plug constructed in a manner to deter entry by children and prevent the entrance of animals and foreign materials.

3.04 PLACEMENT OF PIPE IN TRENCH

A. Control water in trench per Section 312333.

B. Lay pipes uphill if the grade exceeds ten percent (10%).

C. Where pipe bedding material is detailed below the subgrade, place and compact the bedding.

D. Cut a depression to accommodate the pipe bell and external joint filler form and spaces to permit removal of the pipe handling slings.

E. Lower the pipe onto the bedding and install it to line and grade along its full length of firm bearing except at the bell and at the sling depressions. The tolerance on grade is one-quarter inch (1/4"). The tolerance on line is one inch (1").

F. Proceed to complete the pipe embedment as specified in Section 312333.

G. The radius of curvature of the trench shall determine the maximum length of pipe section that can be used without exceeding the allowable deflection at a coupling. The deflection at any flexible joint shall not exceed that prescribed by the manufacturer of the pipe. The manufacturer's printed installation guide outlining the radii of curvature that can be negotiated with pipe sections of various lengths shall be followed.

H. Proper implements, tools and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the Contractor for safe and efficient execution of the work. All pipe, fittings, valves and accessories shall be carefully lowered into the trench by means of handling beams, wide belt slings or

other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

I. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, nor any other method that may fracture the pipe or will produce ragged, uneven edges.

J. The pipe and accessories shall be inspected for defects prior to the lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench.

K. When the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers or main drains, the obstruction shall be permanently supported, relocated, removed or reconstructed by the Contractor in cooperation with owners of such utility structures. Unless otherwise indicated, this work shall be performed at the Contractor's expense.

3.05 ASSEMBLING RUBBER RING JOINTS

A. Clean the ends of the pipe to be joined of foreign material.

B. Immediately prior to lowering each section of pipe into the trench, apply a nontoxic water soluble vegetable soap solution to the inside of the bell of the pipe in the trench and to the rubber gasket and spigot groove of the pipe to be installed. Stretch the rubber gasket into the groove of the spigot end of the pipe to be inserted and distribute it uniformly around the circumference.

C. Without tilting the pipe to be installed, enter its spigot into the bell of the pipe in the trench. Use come-a-longs or pipe jacks to drive spigot end home horizontally. Maintain joint recess recommended by pipe manufacturer or made-up joint. Where deflections at joints are required for curved alignment, do not exceed the pipe manufacturer's recommended maximum joint opening on one side.

3.06 OPERATIONS INCIDENTAL TO JOINT COMPLETION

A. Plan joint completion to accommodate temporary test bulkheads for hydrostatic testing.

3.07 PIPE EMBEDMENT

A. Provide sufficient space along each side of the pipe and the trench wall per plans to observe that the embedment material fills all spaces below pipe spring line under the pipe haunches.

B. Start the backfilling operations specified in Section 312333 immediately after coating the field joints.

3.08 PIPELINE CLOSURE ASSEMBLIES

A. Employ pipeline closure assemblies to unite sections of pipeline laid from opposite directions and to adjust the field length of the pipeline to meet structures, other pipelines, and points established by design stations.

3.09 FLANGED CONNECTIONS

A. Lubricate nuts and bolts with oil or graphite prior to installation.

B. Coat flanges and non-stainless-steel bolts with bitumen as specified.

C. Wrap flanges which connect with buried valves or other equipment with two layers of polyethylene film specified for the valves and equipment. Extend the wrap over the flanges and bolts and secure it around the adjacent pipe circumference with tape.

END OF SECTION

SECTION 33 14 00

HYDROSTATIC TESTING OF PRESSURE PIPELINES

PART 1 - GENERAL

1.01 DESCRIPTION

A. These specifications designate the requirements for field pressure and leakage testing of all new and replaced existing water mains intended for the conveyance of potable, fire water and reclaimed water under pressure. The Contractor shall furnish all labor, materials (including water), tools, and equipment necessary to provide and complete field testing as specified. All pipelines shall be tested for water tightness by subjecting each section to Hydrostatic Pressure and Leakage Tests in accordance with the applicable requirements of AWWA C 600 except as modified herein.

1.02 SUBMITTALS

A. Hydrostatic test results shall be submitted for review and approval.

1.03 JOB CONDITIONS

A. For potable water pipelines, obtain and use only potable water for hydrostatic testing.

B. Submit request for use of water from waterlines to College Project Manager 48 hours in advance.

C. The testing shall be witnessed by the College Project Manager. 2

PART 2 - MATERIALS

2.01 MANUAL AIR-RELEASE VALVES

A. Provide temporary manual air-release valves for pipeline test. Construct the pipe outlet in the same manner as for a permanent air valve and after use, seal with a blind flange, pipe cap, or plug and coat equal to the adjacent pipe.

PART 3 - EXECUTION

3.01 TESTING AND DISINFECTION SEQUENCE

A. Perform required chlorination subsequent to hydrostatic testing, except when pipeline being tested is connected to a potable waterline.

B. The test shall be made prior to connecting the new line with existing pipe and mains. The test shall further be conducted with valves open, and the open ends of pipes, valves, and fittings suitably closed. Valves shall be operated and checked during to the test period. No leakage shall be allowed when testing across any valves.

3.02 INITIAL PIPELINE FILLING

A. Maximum rate of filling shall not cause water velocity in pipeline to exceed 1 fps. Filling may be facilitated by releasing air manually.

3.03 PRESSURE AND DURATION OF TEST

A. All pipe shall be tested at a hydrostatic pressure of 120 percent of maximum rated operating pressure of the pipe, but shall be not less than 200 psi.

B. When the system is pumped to the required test pressure, the pump shall be disconnected and maintain the test pressure for the following duration by restoring it whenever it falls an amount of 10 psi: pipe of 18 inches in diameter and smaller, 4 hours; over 18 inches to 36 inches in diameter, 8 hours; and over 36 inches in diameter, 24 hours.

C. Temporary or permanent thrust blocks shall be cast-in-place as required prior to tests, and the Contractor shall provide all necessary braces, plugs, thrust blocks, caps, flanges, and other materials to permit proper conduct of the pressure testing. Concrete blocks shall be cast not less than 5 days before the test.
   1. All concrete anchor blocks shall be allowed to cure a sufficient time to develop a minimum strength of 2,000 psi before testing, unless otherwise directed by the College Project Manager.

3.04 ALLOWABLE LEAKAGE

A. Permit one to three days for the filled pipeline to soak and to release entrapped air. Apply the test pressure with a positive displacement pump. Provide a snubber or dampener between the pump and the pipeline to reduce instantaneous pressure pulses to 10% of the specified test pressure. Draw from containers in which the volume of water can be readily measured or through a positive displacement meter. The amount of water used to maintain the test pressure during the test period is the leakage. Determine the allowable leakage by the following:

$$L = \frac{N*D(P)1/2}{7,400}$$

where L is the allowable leakage in gallons per hour,
N is the number of pipe joints in the test section,
D is the inside pipe test diameter in inches,
P is the pipe test pressure (psi), which is defined as the average of the highest and lowest test pressures in the pipe section being tested.

*N does not include any flanged or welded joints.

3.05 REPETITION OF TEST

A. If the actual leakage exceeds the allowable, locate and correct the faulty work and repeat the test. Restore the work and all damage resulting from the leak and its repair at no additional cost to the college. All visible leakage shall be eliminated.

END OF SECTION

THE LINE SHOWN ABOVE IS EXACTLY 1" LONG ON ORIGINAL BOND PLANS
0" 1"

LINE TABLE		
LINE #	LENGTH	BEARING
L2	22.87'	N89°22'31"E
L3	28.15'	N00°40'32"W
L4	12.49'	N89°06'25"E
L5	23.58'	N00°37'29"W
L6	51.32'	N79°33'40"E
L7	51.32'	N79°33'40"E
L8	6.26'	N00°37'29"W
L9	56.90'	N00°37'29"W
L10	51.25'	S81°18'13"E
L11	51.25'	S81°17'46"E
L12	18.67'	N00°37'29"W
L13	64.02'	N00°37'29"W
L14	50.57'	N89°22'31"E
L15	50.57'	N89°22'31"E
L16	16.00'	N00°37'29"W

LINE TABLE		
LINE #	LENGTH	BEARING
L17	59.42'	N00°37'29"W
L18	29.70'	N45°40'28"E
L19	77.52'	N90°00'00"W
L20	29.25'	S45°40'28"E
L21	16.39'	S00°27'43"E
L22	224.12'	S89°22'31"W
L23	41.19'	S00°37'29"E
L24	17.00'	S89°22'31"W
L25	12.00'	S00°37'29"E
L26	3.00'	S89°22'31"W
L27	12.00'	N00°37'29"W
L28	17.00'	S89°22'31"W
L29	32.82'	S00°37'29"E
L30	11.75'	N80°37'29"W
L31	17.67'	S09°22'31"W

LINE TABLE		
LINE #	LENGTH	BEARING
L32	14.87'	S80°37'29"E
L33	31.55'	S00°37'29"E
L34	9.00'	N89°22'31"E
L35	5.00'	N00°37'29"W
L36	3.00'	N89°22'31"E
L37	5.00'	S00°37'29"E
L38	13.00'	N89°22'31"E
L39	5.00'	N00°37'29"W
L40	3.00'	N89°22'31"E
L41	5.00'	S00°37'29"E
L42	9.00'	N89°22'31"E
L43	25.03'	N00°37'29"W
L44	4.50'	S80°37'29"E
L45	7.51'	N80°37'29"W
L46	30.41'	N00°37'29"W

LINE TABLE		
LINE #	LENGTH	BEARING
L47	6.00'	N89°22'31"E
L48	44.13'	N00°37'30"W
L49	50.25'	N89°22'31"E
L50	23.82'	S00°37'29"E
L51	14.36'	N00°37'29"W
L52	132.74'	N89°22'31"E
L53	13.52'	S00°37'29"E
L54	22.31'	N00°37'29"W
L55	20.86'	N89°22'31"E
L56	81.63'	S00°37'29"E
L57	7.55'	S08°41'47"W
L58	11.20'	S80°59'01"E
L59	7.61'	N09°00'59"E
L60	72.91'	N81°18'13"W
L61	9.01'	N80°59'51"W

LINE TABLE		
LINE #	LENGTH	BEARING
L62	63.19'	N81°18'13"W
L63	11.00'	N81°18'13"W
L64	48.10'	N81°18'13"W
L65	80.64'	N00°37'29"W
L66	67.59'	S80°37'29"E
L67	8.02'	S09°22'31"W
L68	31.65'	N80°37'20"W
L69	6.37'	S09°22'23"W
L70	2.73'	S80°55'41"E
L71	5.99'	S80°58'21"E
L72	37.27'	S09°22'30"W
L74	5.39'	S80°37'29"E
L76	12.05'	S80°37'30"E
L77	33.86'	S09°22'30"W
L78	59.52'	N09°22'30"E

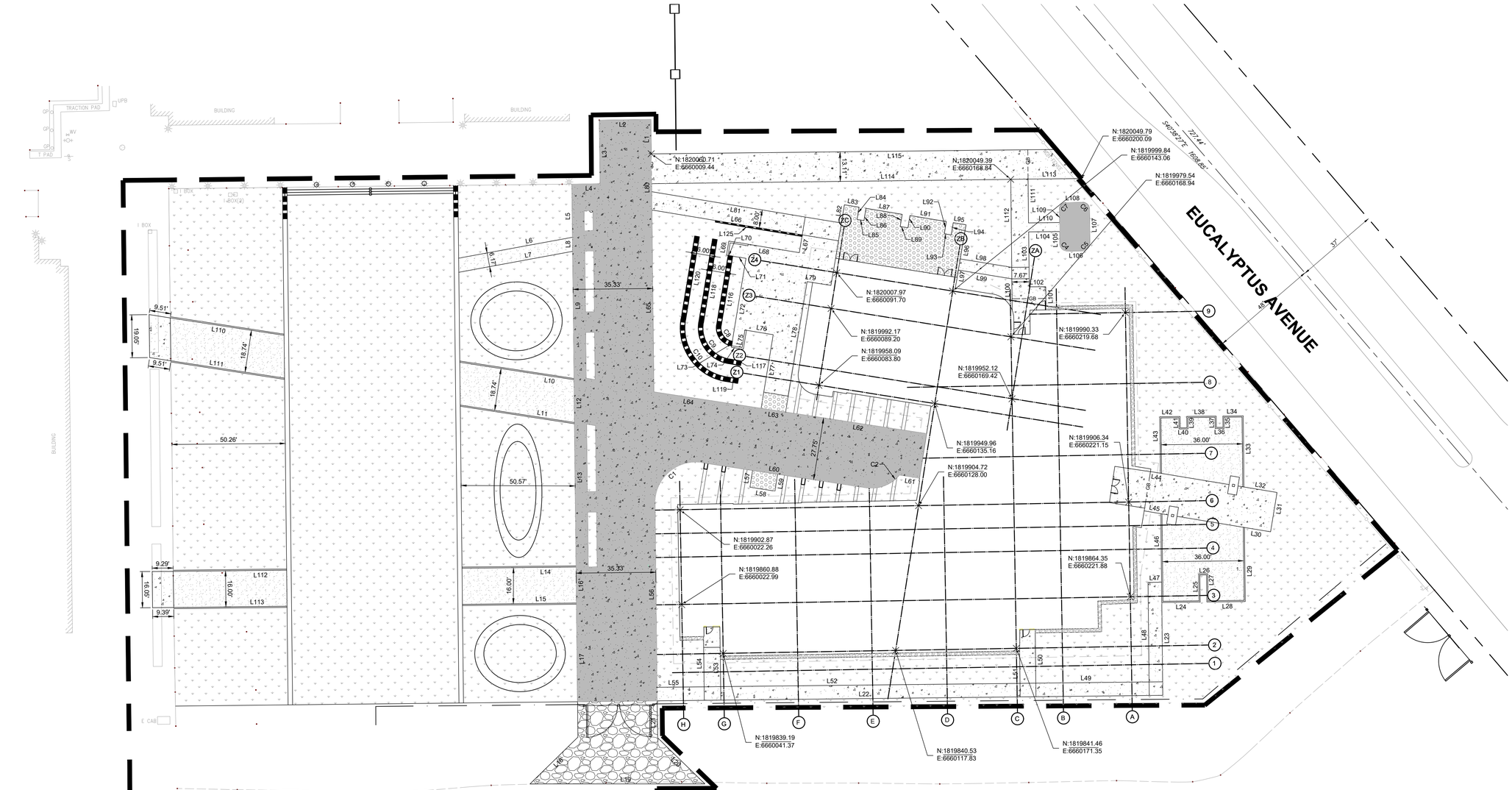
LINE TABLE		
LINE #	LENGTH	BEARING
L79	2.46'	S80°59'01"E
L80	3.57'	S00°37'29"E
L81	85.26'	S80°37'29"E
L82	8.20'	N09°20'17"E
L83	6.58'	S80°37'29"E
L84	5.50'	S09°21'28"W
L85	3.11'	S80°38'30"E
L86	5.50'	N09°21'45"E
L87	16.29'	S80°38'30"E
L88	5.50'	S09°22'05"W
L89	3.46'	S80°38'27"E
L90	5.50'	N09°22'05"E
L91	16.35'	S80°38'17"E
L92	5.51'	S09°22'05"W
L93	3.11'	S80°38'30"E

LINE TABLE		
LINE #	LENGTH	BEARING
L94	5.51'	N09°22'05"E
L95	5.75'	S80°38'23"E
L96	15.33'	S09°37'25"W
L97	3.32'	S09°22'31"W
L98	23.12'	S80°40'43"E
L99	24.04'	N80°40'43"W
L100	13.93'	N00°37'29"W
L101	10.25'	S00°37'29"E
L102	7.32'	N89°42'29"E
L103	24.35'	S00°37'29"E
L104	13.78'	S89°22'31"W
L105	5.55'	N00°37'29"W
L106	7.05'	S89°22'31"W
L107	15.35'	S00°37'29"E
L108	7.30'	N89°22'31"E

LINE TABLE		
LINE #	LENGTH	BEARING
L109	5.82'	N00°37'29"W
L110	13.78'	N89°22'31"E
L110	51.05'	S81°18'13"E
L111	19.41'	S00°37'29"E
L111	51.01'	S81°18'13"E
L112	50.34'	N89°22'31"E
L112	39.00'	N00°37'29"W
L113	23.58'	S89°22'31"W
L113	50.24'	N89°22'31"E
L114	159.27'	S89°19'32"W
L115	179.59'	N89°22'31"E
L116	31.23'	N09°23'21"E
L117	5.34'	S80°37'29"E
L118	37.32'	S09°22'40"W
L119	5.34'	S80°37'29"E

LINE TABLE		
LINE #	LENGTH	BEARING
L120	37.27'	S09°22'42"W
L125	38.92'	N80°37'29"W

CURVE TABLE				
CURVE#	LENGTH (FT.)	RADIUS (FT.)	DELTA	TANGENT (FT.)
C1	31.20	18.00	99°19'20"	21.20
C2	17.29	16.22	61°05'20"	9.57
C8	9.42	6.00	90°00'00"	6.00
C9	21.99	14.00	90°00'00"	14.00
C10	34.56	22.00	90°00'00"	22.00



LEGEND

- CONCRETE PAVING PER DETAIL 1 / SHEET C9.00
- UNIT PAVERS PER LANDSCAPE PLANS, DETAIL 6 / SHEET L1.51
- COMPACTED FIRE ACCESS ROAD PER DETAIL 3 / SHEET C9.00
- PLANTING AREA PER LANDSCAPE PLANS
- DECOMPOSED GRANITE PER LANDSCAPE PLANS, DETAIL I / SHEET L1.51
- LIMITS OF WORK

20' 10' 0' 20' 40'

GRAPHIC SCALE
SCALE: 1" = 20'

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HMC Architects

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ISSUE

Δ	DESCRIPTION	DATE
2	PRE-BID ADDENDUM	02.11.2022

KEYNOTES

LEGENDS

NOTES

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Consultant's Project No. 1HMC019600

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FACILITY:

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5897 COLLEGE PARK AVE.
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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

HORIZONTAL CONTROL PLAN

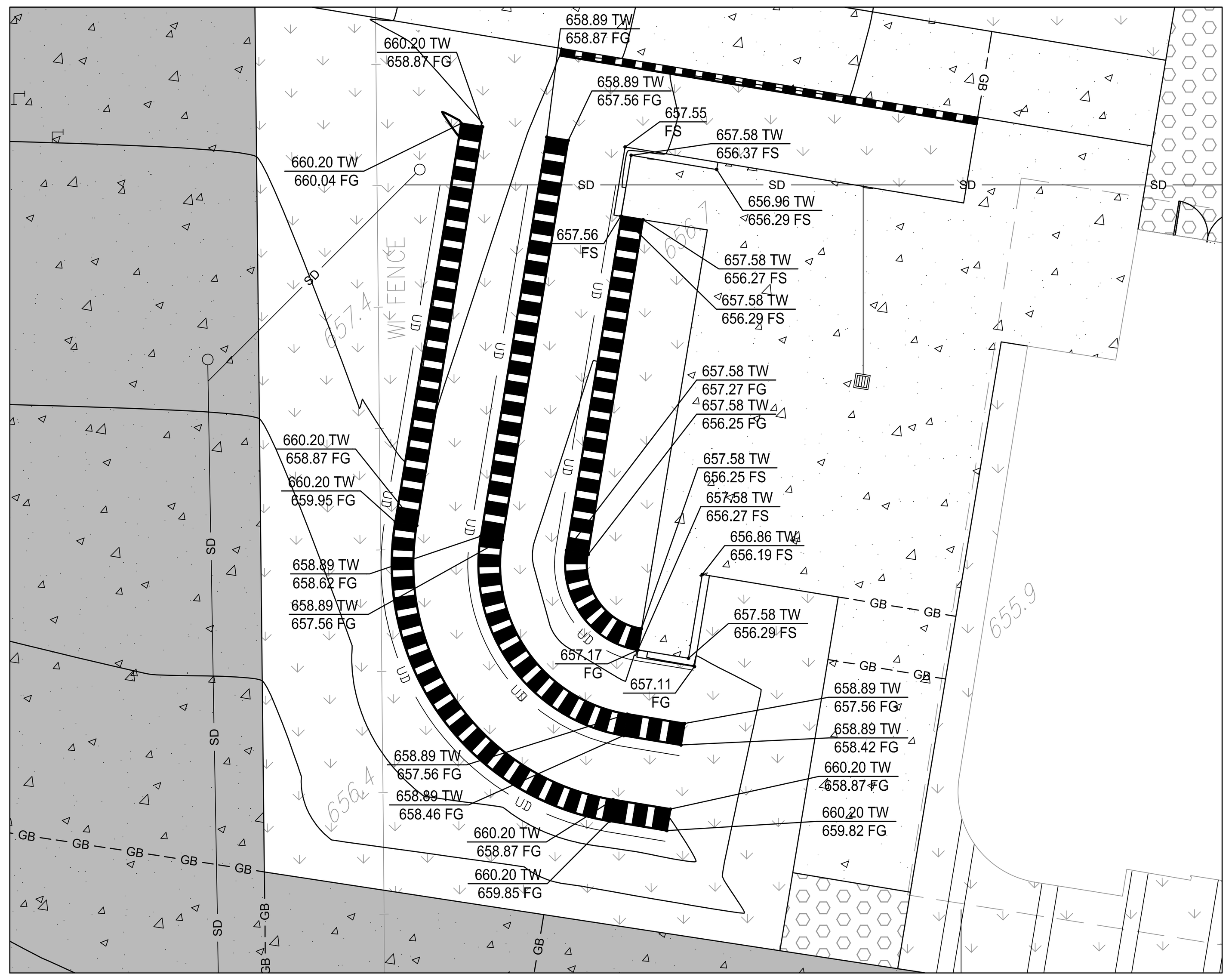
ADDENDUM #2

FILE NO.: 36-C1 A# : 04-119722

DATE: 07.16.2021 CLIENT PROJ NO:

SHEET:

C2.00

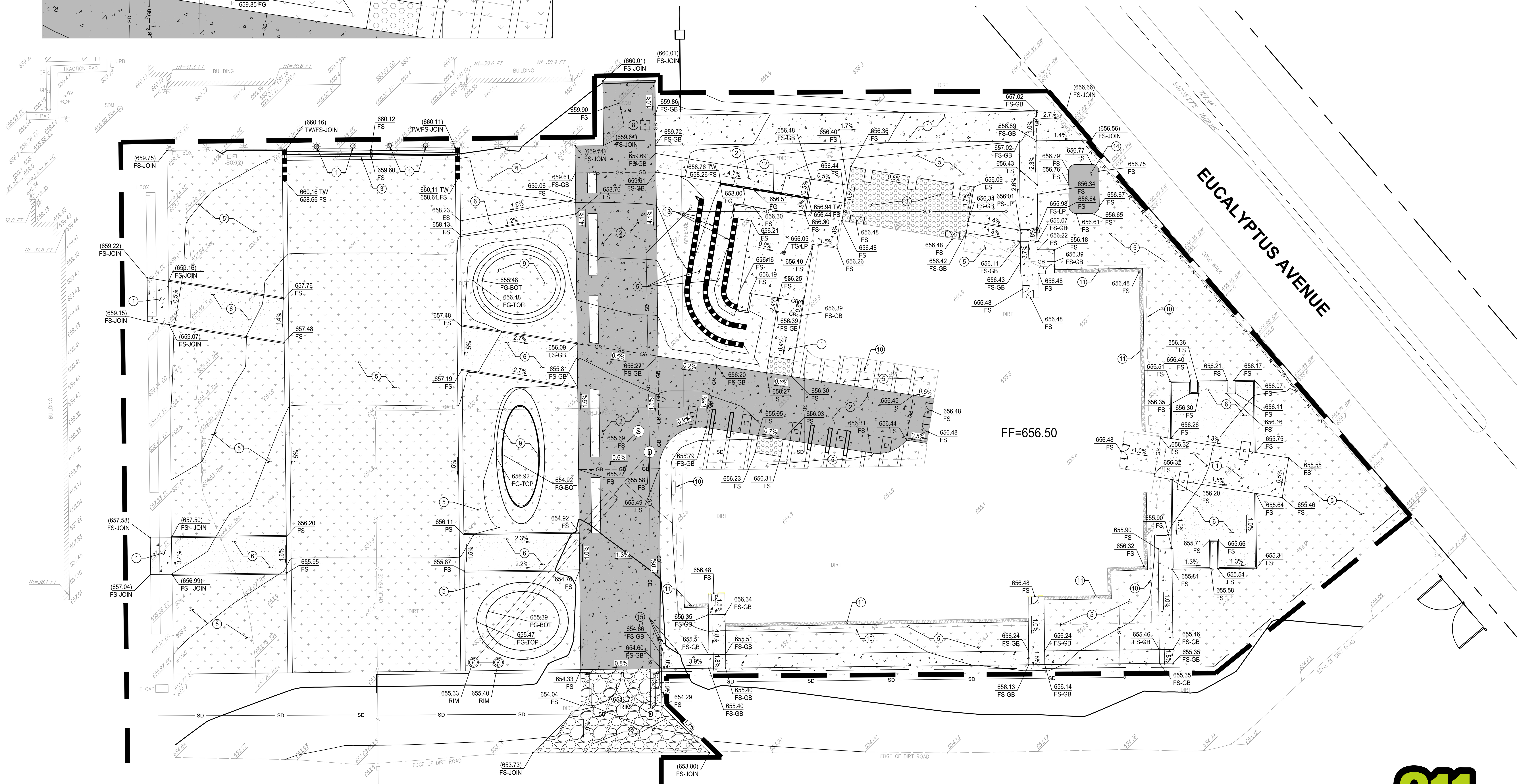


GRAPHIC SCALE
SCALE: 1" = 10'

CONSTRUCTION NOTES:

- CONSTRUCT
- EXISTING TO REMAIN -PROTECT IN PLACE
- EXISTING TO REMOVE
- REMOVE & RELOCATE
- ADJUST TO GRADE
- PER SEPARATE CONTRACT

1. CONCRETE WALKWAY PER DETAIL 1 / SHEET C9.00
2. CONCRETE PAVEMENT PER DETAIL
3. UNIT PAVERS PER LANDSCAPE PLANS, DETAIL G / SHEET L1.51
4. CONCRETE STAIR PER LANDSCAPE PLANS, DETAIL F / SHEET L.51
5. PLANTING AREA PER LANDSCAPE PLANS
6. DECOMPOSED GRANITE PER LANDSCAPE PLANS, DETAIL I / SHEET L1.51
7. FIRE ACCESS, STRUCTURAL SECTION PER DETAIL 3 / SHEET C9.00
8. MANHOLE
9. RAIN GARDEN PER LANDSCAPE PLANS
10. BUILDING OVEREXCAVATION PER GEOTECHNICAL REPORT
11. GRAVEL MAINTENANCE STRIP PER LANDSCAPE PLANS, DETAIL I / SHEET L3.51
12. CONCRETE RETAINING WALL PER LANDSCAPE PLANS, DETAIL P / SHEET L1.52
13. CONCRETE SEAT WALL PER LANDSCAPE PLANS, DETAIL E / SHEET L1.53
14. SUBSTATION CONCRETE PAD PER ELECTRICAL PLANS, DETAIL 4 / SHEET E5.12
15. BOLLARDS PER DETAIL 3 / SHEET C9.01



LEGEND

- CONCRETE PAVING PER DETAIL 1 / SHEET C9.00
- UNIT PAVERS PER LANDSCAPE PLANS, DETAIL 6 / SHEET L1.51
- COMPACTED FIRE ACCESS ROAD PER DETAIL 3 / SHEET C9.00
- PLANTING AREA PER LANDSCAPE PLANS
- HEAVY DUTY CONCRETE PAVING PER DETAIL 2 / SHEET C9.00
- DECOMPOSED GRANITE PER LANDSCAPE PLANS, DETAIL I / SHEET L1.51
- ELECTRICAL PAD PER ELECTRICAL PLANS, SHEET E1.21
- LIMITS OF WORK

GRAPHIC SCALE
SCALE: 1" = 20'

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KEYNOTES

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PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
GRADING PLAN

ADDENDUM #2

FILE NO.: 36-C1 | A#: 04-119722
DATE: 02.03.2022 | CLIENT PROJ NO:
SHEET:
C3.00

PLEASE RECYCLE

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THE LINE SHOWN ABOVE IS EXACTLY 1 INCH LONG WHEN PLOTTED ON 30X42 (ARCH D) SHEETS

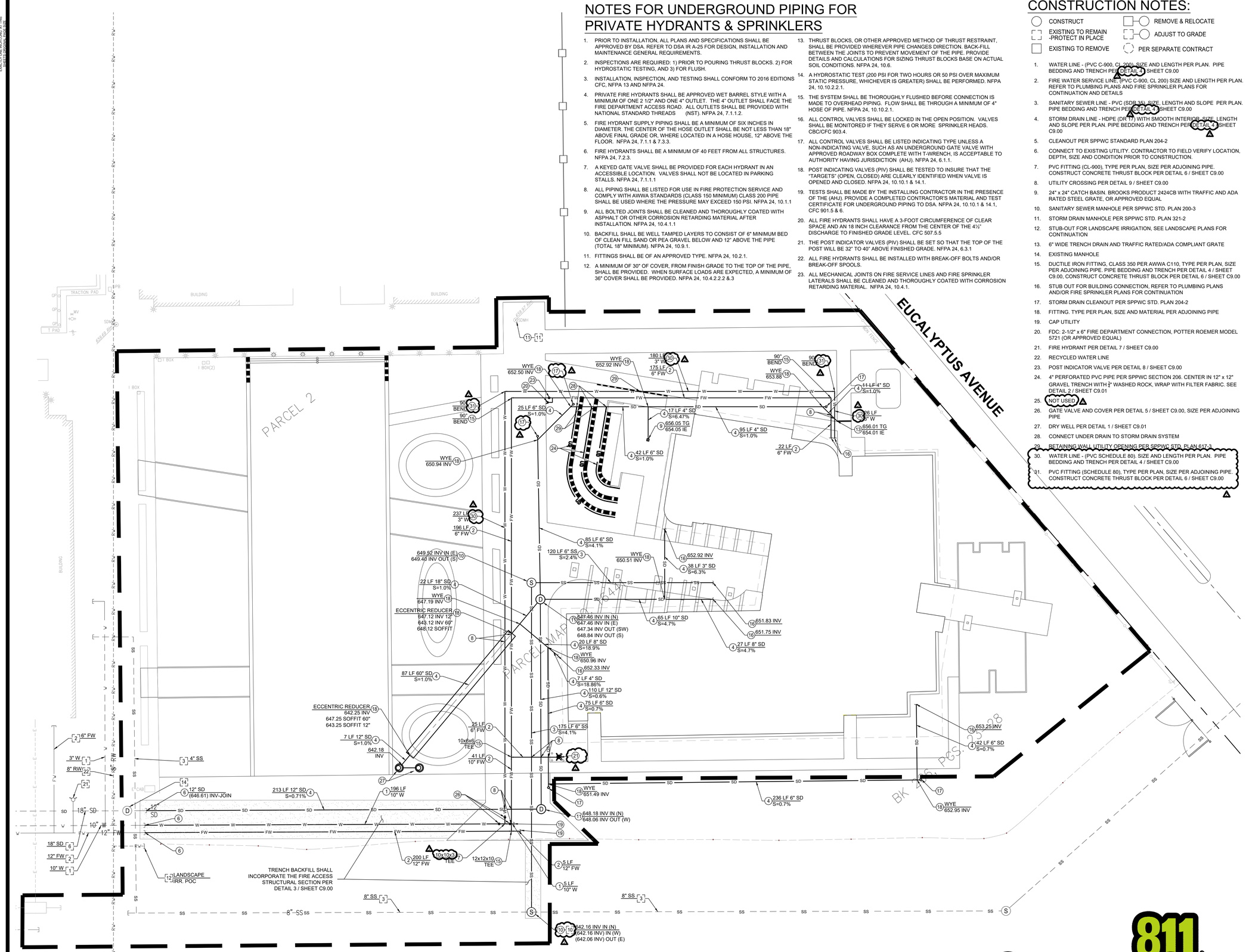
NOTES FOR UNDERGROUND PIPING FOR PRIVATE HYDRANTS & SPRINKLERS

1. PRIOR TO INSTALLATION, ALL PLANS AND SPECIFICATIONS SHALL BE APPROVED BY DSA. REFER TO DSA IR A-25 FOR DESIGN, INSTALLATION AND MAINTENANCE GENERAL REQUIREMENTS.
2. INSPECTIONS ARE REQUIRED: 1) PRIOR TO POURING THRUST BLOCKS. 2) FOR HYDROSTATIC TESTING, AND 3) FOR FLUSH.
3. INSTALLATION, INSPECTION, AND TESTING SHALL CONFORM TO 2016 EDITIONS CFC, NFPA 13 AND NFPA 24.
4. PRIVATE FIRE HYDRANTS SHALL BE APPROVED WET BARREL STYLE WITH A MINIMUM OF ONE 2 1/2" AND ONE 4" OUTLET. THE 4" OUTLET SHALL FACE THE FIRE DEPARTMENT ACCESS ROAD. ALL OUTLETS SHALL BE PROVIDED WITH NATIONAL STANDARD THREADS (NST). NFPA 24, 7.1.1.2.
5. FIRE HYDRANT SUPPLY PIPING SHALL BE A MINIMUM OF SIX INCHES IN DIAMETER. THE CENTER OF THE HOSE OUTLET SHALL BE NOT LESS THAN 18" ABOVE FINAL GRADE OR, WHERE LOCATED IN A HOSE HOUSE, 12" ABOVE THE FLOOR. NFPA 24, 7.1.1 & 7.3.3.
6. FIRE HYDRANTS SHALL BE A MINIMUM OF 40 FEET FROM ALL STRUCTURES. NFPA 24, 7.2.3.
7. A KEYED GATE VALVE SHALL BE PROVIDED FOR EACH HYDRANT IN AN ACCESSIBLE LOCATION. VALVES SHALL NOT BE LOCATED IN PARKING STALLS. NFPA 24, 7.1.1.1
8. ALL PIPING SHALL BE LISTED FOR USE IN FIRE PROTECTION SERVICE AND COMPLY WITH AWWA STANDARDS (CLASS 150 MINIMUM) CLASS 200 PIPE SHALL BE USED WHERE THE PRESSURE MAY EXCEED 150 PSI. NFPA 24, 10.1.1
9. ALL BOLTED JOINTS SHALL BE CLEANED AND THOROUGHLY COATED WITH ASPHALT OR OTHER CORROSION RETARDING MATERIAL AFTER INSTALLATION. NFPA 24, 10.4.1.1
10. BACKFILL SHALL BE WELL TAMPED LAYERS TO CONSIST OF 6" MINIMUM BED OF CLEAN FILL SAND OR PEA GRAVEL BELOW AND 12" ABOVE THE PIPE (TOTAL 18" MINIMUM). NFPA 24, 10.9.1.
11. FITTINGS SHALL BE OF AN APPROVED TYPE. NFPA 24, 10.2.1.
12. A MINIMUM OF 30" OF COVER, FROM FINISH GRADE TO THE TOP OF THE PIPE, SHALL BE PROVIDED. WHEN SURFACE LOADS ARE EXPECTED, A MINIMUM OF 36" COVER SHALL BE PROVIDED. NFPA 24, 10.4.2.2.2 & 3
13. THRUST BLOCKS, OR OTHER APPROVED METHOD OF THRUST RESTRAINT, SHALL BE PROVIDED WHEREVER PIPE CHANGES DIRECTION. BACK-FILL BETWEEN THE JOINTS TO PREVENT MOVEMENT OF THE PIPE. PROVIDE DETAILS AND CALCULATIONS FOR SIZING THRUST BLOCKS BASE ON ACTUAL SOIL CONDITIONS. NFPA 24, 10.6.
14. A HYDROSTATIC TEST (200 PSI FOR TWO HOURS OR 50 PSI OVER MAXIMUM STATIC PRESSURE, WHICHEVER IS GREATER) SHALL BE PERFORMED. NFPA 24, 10.10.2.2.1.
15. THE SYSTEM SHALL BE THOROUGHLY FLUSHED BEFORE CONNECTION IS MADE TO OVERHEAD PIPING. FLOW SHALL BE THROUGH A MINIMUM OF 4" HOSE OF PIPE. NFPA 24, 10.10.2.1.
16. ALL CONTROL VALVES SHALL BE LOCKED IN THE OPEN POSITION. VALVES SHALL BE MONITORED IF THEY SERVE 6 OR MORE SPRINKLER HEADS. CBC/CFC 903.4.
17. ALL CONTROL VALVES SHALL BE LISTED INDICATING TYPE UNLESS A NON-INDICATING VALVE, SUCH AS AN UNDERGROUND GATE VALVE WITH APPROVED ROADWAY BOX COMPLETE WITH T-WRENCH, IS ACCEPTABLE TO AUTHORITY HAVING JURISDICTION (AHJ). NFPA 24, 6.1.1.
18. POST INDICATING VALVES (PIV) SHALL BE TESTED TO INSURE THAT THE "TARGETS" (OPEN, CLOSED) ARE CLEARLY IDENTIFIED WHEN VALVE IS OPENED AND CLOSED. NFPA 24, 10.10.1 & 14.1.
19. TESTS SHALL BE MADE BY THE INSTALLING CONTRACTOR IN THE PRESENCE OF THE (AHJ). PROVIDE A COMPLETED CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR UNDERGROUND PIPING TO DSA. NFPA 24, 10.10.1 & 14.1, CFC 901.5 & 6.
20. ALL FIRE HYDRANTS SHALL HAVE A 3-FOOT CIRCUMFERENCE OF CLEAR SPACE AND AN 18 INCH CLEARANCE FROM THE CENTER OF THE 4½" DISCHARGE TO FINISHED GRADE LEVEL. CFC 507.5.5
21. THE POST INDICATOR VALVES (PIV) SHALL BE SET SO THAT THE TOP OF THE POST WILL BE 32" TO 40" ABOVE FINISHED GRADE. NFPA 24, 6.3.1
22. ALL FIRE HYDRANTS SHALL BE INSTALLED WITH BREAK-OFF BOLTS AND/OR BREAK-OFF SPOOLS.
23. ALL MECHANICAL JOINTS ON FIRE SERVICE LINES AND FIRE SPRINKLER LATERALS SHALL BE CLEANED AND THOROUGHLY COATED WITH CORROSION RETARDING MATERIAL. NFPA 24, 10.4.1.

CONSTRUCTION NOTES:

- CONSTRUCT
- EXISTING TO REMAIN -PROTECT IN PLACE
- EXISTING TO REMOVE
- REMOVE & RELOCATE
- ADJUST TO GRADE
- PER SEPARATE CONTRACT

1. WATER LINE - (PVC C-900, CL 200) SIZE AND LENGTH PER PLAN. PIPE BEDDING AND TRENCH PER DETAIL 4 / SHEET C9.00
2. FIRE WATER SERVICE LINE - (PVC C-900, CL 200) SIZE AND LENGTH PER PLAN. REFER TO PLUMBING PLANS AND FIRE SPRINKLER PLANS FOR CONTINUATION AND DETAILS
3. SANITARY SEWER LINE - PVC (SDR-35) SIZE, LENGTH AND SLOPE PER PLAN. PIPE BEDDING AND TRENCH PER DETAIL 4 / SHEET C9.00
4. STORM DRAIN LINE - HDPE (DR 17) WITH SMOOTH INTERIOR, SIZE, LENGTH AND SLOPE PER PLAN. PIPE BEDDING AND TRENCH PER DETAIL 4 / SHEET C9.00
5. CLEANOUT PER SPPWC STANDARD PLAN 204-2
6. CONNECT TO EXISTING UTILITY. CONTRACTOR TO FIELD VERIFY LOCATION, DEPTH, SIZE AND CONDITION PRIOR TO CONSTRUCTION.
7. PVC FITTING (CL-900), TYPE PER PLAN, SIZE PER ADJOINING PIPE. CONSTRUCT CONCRETE THRUST BLOCK PER DETAIL 6 / SHEET C9.00
8. UTILITY CROSSING PER DETAIL 9 / SHEET C9.00
9. 24" x 24" CATCH BASIN. BROOKS PRODUCT 2424CB WITH TRAFFIC AND ADA RATED STEEL GRATE, OR APPROVED EQUAL
10. SANITARY SEWER MANHOLE PER SPPWC STD. PLAN 200-3
11. STORM DRAIN MANHOLE PER SPPWC STD. PLAN 321-2
12. STUB-OUT FOR LANDSCAPE IRRIGATION, SEE LANDSCAPE PLANS FOR CONTINUATION
13. 6" WIDE TRENCH DRAIN AND TRAFFIC RATED/ADA COMPLIANT GRATE
14. EXISTING MANHOLE
15. DUCTILE IRON FITTING, CLASS 350 PER AWWA C110, TYPE PER PLAN, SIZE PER ADJOINING PIPE. PIPE BEDDING AND TRENCH PER DETAIL 4 / SHEET C9.00, CONSTRUCT CONCRETE THRUST BLOCK PER DETAIL 6 / SHEET C9.00
16. STUB OUT FOR BUILDING CONNECTION, REFER TO PLUMBING PLANS AND/OR FIRE SPRINKLER PLANS FOR CONTINUATION
17. STORM DRAIN CLEANOUT PER SPPWC STD. PLAN 204-2
18. FITTING. TYPE PER PLAN, SIZE AND MATERIAL PER ADJOINING PIPE
19. CAP UTILITY
20. FDC: 2-1/2" x 6" FIRE DEPARTMENT CONNECTION, POTTER ROEMER MODEL 5721 (OR APPROVED EQUAL)
21. FIRE HYDRANT PER DETAIL 7 / SHEET C9.00
22. RECYCLED WATER LINE
23. POST INDICATOR VALVE PER DETAIL 8 / SHEET C9.00
24. 4" PERFORATED PVC PIPE PER SPPWC SECTION 206. CENTER IN 12" x 12" GRAVEL TRENCH WITH ¾" WASHED ROCK, WRAP WITH FILTER FABRIC. SEE DETAIL 2 / SHEET C9.01
25. NOT USED
26. GATE VALVE AND COVER PER DETAIL 5 / SHEET C9.00, SIZE PER ADJOINING PIPE
27. DRY WELL PER DETAIL 1 / SHEET C9.01
28. CONNECT UNDER DRAIN TO STORM DRAIN SYSTEM
29. RETAINING WALL UTILITY OPENING PER SPPWC STD. PLAN 617-3
30. WATER LINE - (PVC SCHEDULE 80), SIZE AND LENGTH PER PLAN. PIPE BEDDING AND TRENCH PER DETAIL 4 / SHEET C9.00
31. PVC FITTING (SCHEDULE 80), TYPE PER PLAN, SIZE PER ADJOINING PIPE. CONSTRUCT CONCRETE THRUST BLOCK PER DETAIL 6 / SHEET C9.00



20' 10' 0' 20' 40'

GRAPHIC SCALE
SCALE: 1" = 20'

Know what's below. Call before you dig.

PLEASE RECYCLE

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

Chaffey College

HMC Architects

5009006-000

3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

ISSUE

Δ	DESCRIPTION	DATE
2	PRE-BID ADDENDUM	02.11.2022

KEYNOTES

LEGENDS

NOTES

PSOMAS
555 South Flower Street, Suite 4300
Los Angeles, CA 90071
Tel. (213) 223-1400 Fax (213) 223-1444

Consultant's Project No. 1HMC019600

REGISTERED PROFESSIONAL ENGINEER RYAN LYNCH No. C71441 CIVIL STATE OF CALIFORNIA

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

UTILITY PLAN

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 02.03.2022 | CLIENT PROJ NO:

SHEET:

C4.00

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH (25d) AT THIS ORIGINAL PLOTTED SIZE

CONSTRUCTION NOTES

1. REFERENCES OF THE A.S.T.M.S. AND THE CALIFORNIA BUILDING CODE SHALL BE TO THE LATEST EDITIONS AS ADOPTED BY LOCAL JURISDICTION.
2. REFER TO CITY AND COUNTY STANDARDS FOR STANDARD PLANS AND SPECIFICATIONS WHERE APPLICABLE
3. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATION GRADES, EXISTING STRUCTURES, SPECIFICATIONS AND FIELD CONDITIONS AT THE SITE BEFORE COMMENCING WORK. WHERE CONFLICTS OCCUR, NOTIFY OWNER'S AUTHORIZED REPRESENTATIVE FOR CLARIFICATION. FAILURE TO PROVIDE SUCH NOTIFICATION MAY MAKE CONTRACTOR LIABLE FOR COSTS INCURRED TO RECTIFY THE DISCREPANCY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONSULT WITH GENERAL CONTRACTOR AND DRAWINGS FOR VERIFYING LOCATIONS OF UNDERGROUND UTILITIES, PIPES, AND RELATED STRUCTURES. THE CONTRACTOR SHALL TAKE SOLE RESPONSIBILITY FOR COSTS INCURRED DUE TO DAMAGE OF SAID UTILITIES IF PROPER VERIFICATION WAS NOT PERFORMED.
5. AREAS WITHIN SCOPE OF WORK SHALL BE TREATED WITH CONTACT HERBICIDE TEN (10) DAYS PRIOR TO START OF WORK. VERIFY WITH LANDSCAPE ARCHITECT.
6. AREAS TO BE GRADED OR PAVED SHALL BE GRUBBED AND STRIPPED OF ALL VEGETATION, DEBRIS, AND OTHER DELETERIOUS MATERIAL. ALL LOOSE SOIL DISTURBED BY REMOVAL OF TREES, EXISTING FILL AND LOOSE OR DISTURBED TOPSOIL SHALL BE REMOVED.
7. PLANS ARE FOR THE PURPOSE OF HORIZONTAL CONTROL (STAKING) OF CONSTRUCTION FEATURES NOT LOCATED BY THE PROJECT CIVIL ENGINEER OR ARCHITECTURAL DRAWINGS AND FOR CONSTRUCTION REFERENCE OF SITE CONSTRUCTION FEATURES DETAILED HEREIN.
8. ALL DIMENSIONS ARE STAKED PERPENDICULAR OR PARALLEL, UNLESS OTHERWISE INDICATED.
9. CONTRACTOR SHALL ENSURE THAT FINE GRADES HAVE BEEN SET CORRECTLY PRIOR TO INSTALLING WALKS, FOOTINGS, WALLS, AND OTHER STRUCTURES.
10. CONTRACTOR SHALL ENSURE THAT DRAINLINES, ELECTRICAL CONDUITS, SLEEVES, ETC., ARE IN PLACE PRIOR TO INSTALLATION OF PAVING AND WALLS
11. ENSURE THAT CURVED EDGES HAVE SMOOTH AND CONTINUOUS CURVES.
12. CONTRACTOR SHALL SUBMIT A CONCRETE FLATWORK JOINTING PLAN SHOWING ISOLATION AND CONTRACTION JOINTS BASED ON DESIGN PER PLAN - FOR LANDSCAPE ARCHITECT APPROVAL.
13. CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT FOR HARDSCAPE FORM REVIEW, APPROVAL BEFORE POURING CONCRETE.
14. WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALING OF DRAWINGS.
15. TYPICAL DETAILS SHALL APPLY IN GENERAL CONSTRUCTION WHERE NO DETAILS ARE GIVEN. THE CONSTRUCTION SHALL BE AS FOR SIMILAR WORK. OMISSIONS, AND/OR FIELD CONDITIONS, SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT BEFORE PROCEEDING WITH THE WORK SO INVOLVED.
16. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REFER TO PLANTING PLANS TO DETERMINE LOCATION OF SPECIMEN TREES AND TO ROUTE UNDERGROUND STRUCTURES AROUND THESE LOCATIONS
17. IMPORT SOIL SHALL BE APPROVED ON SITE BY OWNER'S REPRESENTATIVE. REFER TO SPECIFICATIONS FOR SOIL REQUIREMENTS. SOIL SHALL BE FREE FROM ROCK, DEBRIS, NUT GRASS, BERMUDA GRASS OR OTHER DELETERIOUS MATERIAL.
18. CONCRETE SHALL BE TRANSIT MIXED FROM A LICENSED BATCHING PLANT, WHICH SHALL BE 2500 P.S.I. AT 28 DAYS. ALL EXPOSED FINISHED CONCRETE SHALL HAVE A COLOR ADDITIVE. COLOR AND STRENGTH TO BE SELECTED BY LANDSCAPE ARCHITECT. CONTRACTOR SHALL SUBMIT A 5'X5' SAMPLE OF FINISHED CONCRETE TO LANDSCAPE ARCHITECT FOR APPROVAL.
19. REINFORCING STEEL: A.S.T.M. A-615, GRADE 40 FOR ALL REINFORCING. MINIMUM CLEARANCE FOR BARS SHALL BE 3" AT BOTTOM OF FOOTING AND 1 1/2" AT BOTTOM OF SLABS ON GRADE.
20. SLEEVES: CONCRETE CONTRACTOR SHALL PROVIDE PVC UNDER PAVING. THE LOCATIONS SHALL BE COORDINATED WITH THE ELECTRIC CONTRACTOR AND IRRIGATION CONTRACTOR.
21. MORTAR SHALL BE 1: 3 1/2 : 1/4 TO 1/2 PARTS BY VOLUME OF PORTLAND CEMENT, TO MORTAR SAND, TO LIME PUTTY. USE NO FIRE CLAY, ADD 1 PINT ADMIXTURE PER SACK OF CEMENT TO INHIBIT EFFLORESCENCE.
22. USE AT LEAST A 1-SACK MIXER. MEASURE PARTS BY VOLUME FOR UNIFORMITY.
    A. FOR MORTAR, LOAD MORTAR SAND, PORTLAND CEMENT, ADMIXTURE, AND WATER INTO MIXER IN THAT ORDER, AND MIX FOR 3 MINUTES THEN ADD LIME PUTTY AND MIX ADDITIONAL 10 MINUTES.
    B. FOR GROUT, LOAD PEA GRAVEL, IF USED, SAND, PORTLAND CEMENT, ADMIXTURE, AND WATER INTO THE MIXER FOR 3 MINUTES. USE ENOUGH WATER TO FORM A POURING CONSISTENCY AND COLOR PER PLANS.
    C. DO NOT USE ANY MORTAR OR GROUT AFTER MORE THAN 1 1/2 HOURS OF ITS INITIAL MIXING, EXCEPT MORTAR MAY BE RE-TEMPERED.
23. EXCESS SOIL SHALL BE REMOVED FROM SITE.
24. REPLACE OR REPAIR EXISTING MATERIAL THAT ARE DAMAGED BY CONTRACTOR DURING CONSTRUCTION OPERATIONS.
25. REFER TO MASTER CONSTRUCTION LEGEND FOR ADDITIONAL INFORMATION.

DEMOLITION NOTES

1. CONTRACTOR IS RESPONSIBLE FOR COMPLETE REMOVAL FROM SITE ALL MATERIAL UNLESS SPECIFIED ON THE CONSTRUCTION DOCUMENTS TO REMAIN, TO BE STORED ON SITE OR TURNED OVER TO CAMPUS. SUCH MATERIALS INCLUDE BUT ARE NOT LIMITED TO; CONCRETE CURBS, ASPHALT CONCRETE, CONCRETE PAVING, CATCH BASINS, TREES AND SHRUBS, IRRIGATION VALVES, PIPING AND WIRING, CLEARING AND GRUBBING OF PLANT MATERIAL, POSTS, FIXTURES, FURNISHINGS, ANY FOUNDATIONS, AND OTHER MISCELLANEOUS OBJECTS NOT PERTINENT TO THE FINAL DESIGN. CONTRACTOR SHALL CLEAR SITE OF ANY REMAINING DEBRIS NOT IN STORAGE PRIOR TO BEGINNING NEW CONSTRUCTION. ALL DEBRIS SHALL BE LEGALLY DISPOSED IN ACCORDANCE WITH THE SPECIFICATIONS AND ACCEPTED STANDARD PRACTICES.
2. CONTRACTOR TO PROCURE CITY, COUNTY, AND STATE PERMITS AND LICENSES, INCLUDING MUNICIPAL BUSINESS LICENSE, AND PAY ALL CHARGES AND FEES FOR THE SAME WITHOUT COST TO THE CAMPUS IF REQUIRED.
3. CONTRACTOR IS RESPONSIBLE FOR INVESTIGATING AND LOCATING EXISTING UTILITIES PRIOR TO ANY DEMOLITION AND IS RESPONSIBLE FOR DAMAGE TO UTILITIES. NOTIFY USA ALERT @ 800-422-4133 (72) HOURS PRIOR TO START OF WORK.
4. CONTRACTOR SHALL PROTECT ALL EXISTING CONSTRUCTION, MATERIALS AND PLANT MATERIAL TO REMAIN DURING DEMOLITION AND IS RESPONSIBLE FOR REPLACEMENT OR REPAIR OF ANY DAMAGED MATERIAL NOT SPECIFIED FOR REMOVAL.
5. CONTRACTOR SHALL REPORT ANY POTENTIAL PROBLEMS OR DISCREPANCIES TO THE CAMPUS AND LANDSCAPE ARCHITECT PRIOR TO COMMENCING ANY DEMOLITION WORK. DO NOT WILLFULLY PROCEED WITH WORK AS SHOWN WHEN IT IS OBVIOUS THAT CONDITIONS AND/OR OBJECTS EXIST THAT MAY NOT HAVE BEEN KNOWN DURING DESIGN. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR ALL NECESSARY REVISIONS DUE TO FAILURE TO GIVE SUCH NOTIFICATION.
6. CONTRACTOR SHALL SECURE THE CONSTRUCTION SITE FOR THE ENTIRE LENGTH OF THE CONSTRUCTION PERIOD, INCLUDING THE MAINTENANCE PERIOD, WITH A 6' HIGH TEMPORARY CHAIN LINK FENCE. LOCATION OF FENCE AND GATES SHALL BE AS SHOWN BY THE LIMIT-OF-WORK LINE ON PLAN.
7. CONTRACTOR IS RESPONSIBLE FOR ALL EROSION CONTROL ON THE CONSTRUCTION SITE, DURING CONSTRUCTION AND THROUGH THE MAINTENANCE PERIODS.
8. REMOVE OR DISPOSE OF CRUSHED ROCK, ASPHALT, CONCRETE, CURBS, GUTTER, AND DEBRIS ON GROUND SURFACE PER PLAN.
9. BREAK UP AND REMOVE EXISTING CONCRETE TO INDICATED LIMITS. CUT NEAT AND EVEN LINES WITH A CONCRETE CUTTING SAW. MINIMUM DEPTH OF CUT SHALL BE 1-1/2 INCHES, UNLESS OTHERWISE REQUIRED. REMOVE CONCRETE BROKEN BEYOND THE INDICATED LIMITS TO THE NEAREST JOINT OR SCORE LINE AND REPLACE WITH NEW CONCRETE TO MATCH EXISTING. REMOVED CONCRETE SHALL BE STOCKPILED IN SPECIFIED LOCATION SPECIFIED BY THE DRAWINGS FOR LATER USE AS BROKEN CONCRETE PAVING.
10. ALL MATERIALS SPECIFIED TO BE REMOVED SHALL BE LEGALLY DISPOSED OF OFF-SITE PER LOCAL CODES AND REGULATIONS.
11. CONTROL DUST AND NOISE DURING DEMOLITION OPERATIONS, PER LOCAL CODES. EXCESSIVE BLOWING DUST AND DEBRIS WILL NOT BE PERMITTED AT ANY TIME.
12. CONDUCT DEMOLITION WORK IN ACCORDANCE WITH APPLICABLE SAFETY REQUIREMENTS OF THE CALIFORNIA ADMINISTRATIVE CODE, TITLE 19, THE LATEST CONSTRUCTION SAFETY ORDERS OF THE DIVISION OF INDUSTRIAL SAFETY, STATE OF CALIFORNIA, THE ASSOCIATED GENERAL CONTRACTORS' MANUAL OF ACCIDENT PREVENTION IN CONSTRUCTION, LATEST EDITION, AND THE APPLICABLE REQUIREMENTS OF THE CALIFORNIA BUILDING CODE, LATEST EDITION.

TREE PROTECTION NOTES

1. TRIMMING AND PRUNING SHALL BE PERFORMED ONLY UNDER THE SUPERVISION OF THE OWNER OR ARBORIST OF RECORD.
2. CHAIN LINK FENCING, FIVE (5) FEET IN HEIGHT, WILL BE SECURED TO TWO-INCH DIAMETER GALVANIZED IRON POSTS SPACED NO MORE THAN TEN FEET APART AS DELINEATED ON THE TREE PROTECTION PLAN. A TWO (2) FOOT WIDE ACCESS GATE IS PERMITTED. INSTALLATION OF PROTECTION FENCING IS THE RESPONSIBILITY OF THE CONTRACTOR. PARKING OR STORING OF VEHICLES, TRAILERS, EQUIPMENT, MACHINERY OR CONSTRUCTION MATERIALS WILL NOT BE PERMITTED WITHIN AREAS DELINEATED BY PROTECTIVE FENCES, NOR WILL DUMPING OF OILS OR CHEMICALS.
3. FENCES ARE CRITICAL TO (1) PREVENT DIRECT CONTACT AND DAMAGE TO THE CANOPY, BRANCHES, AND TRUNK, (2) PRESERVE ROOTS AND SOIL IN AN INTACT AND NON-COMPACTED STATE, AND (3) IDENTIFY THE TREE PROTECTION ZONE. THE TREE PROTECTION FENCE SHALL BE CONTINUOUSLY MAINTAINED AND REPAIRED AS NECESSARY THROUGHOUT THE CONSTRUCTION PERIOD AND REMAIN IN PLACE UNTIL FINAL LANDSCAPE WORK COMMENCES.
4. DURING THE COURSE OF CONSTRUCTION, RELOCATION OF THE FENCE MAY BE REQUIRED TO ACCOMMODATE CONSTRUCTION. THE CONTRACTOR MAY DO SO WITH THE APPROVAL OF THE OWNER OR ARBORIST OF RECORD AT NO ADDITIONAL EXPENSE.
5. DURING THE COURSE OF CONSTRUCTION THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT THE EXISTING TREES FROM INJURY. THE ROOTS, TRUNKS, AND FOLIAGE OF ALL EXISTING TREES SHALL BE PROTECTED. THE CONTRACTOR SHALL KEEP THE SITE AREA AROUND ALL EXISTING TREES FREE FROM DEBRIS AT ALL TIMES.
6. TREES SUBJECT TO THE PROVISIONS OF THESE REQUIREMENTS THAT HAVE BEEN INJURED FOR ANY REASON SHALL BE REPAIRED IMMEDIATELY BY THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE. REPAIR SHALL INCLUDE REMOVAL OF ROUGH BARK EDGES AND SEVERELY INJURED BRANCHES AS DIRECTED BY THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE.
    A. APPROVAL BY THE OWNER FOR WORK WITHIN THE FENCED AREA SHALL NOT RELEASE THE CONTRACTOR FROM ANY REQUIREMENT TO PROTECT EXISTING TREES TO BE PRESERVED.
    B. DURING THE COURSE OF CONSTRUCTION WITHIN THE FENCED AREA, NO ROOTS LARGER THAN TWO (2) INCHES IN DIAMETER SHALL BE CUT WITHOUT PRIOR APPROVAL FROM THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE.
7. DURING CONSTRUCTION, THE EXISTING DRAINAGE PATTERNS SHALL NOT BE ALTERED WITHIN THE AREA OF THE DRIPLINE.
8. THE FOLLOWING IS NOT PERMITTED WITHIN THE DRIPLINE OF ANY EXISTING TREE TO BE PRESERVED:
    A. STORAGE OR PARKING OF AUTOMOBILES OR OTHER VEHICLES.
    B. STOCKPILING OF BUILDING MATERIALS OR REFUSE OF EXCAVATED MATERIALS.
    C. SKINNING OR BRUISING OF BARK.
    D. USE OF TREES AS SUPPORT POSTS, POWER POLES, OR SIGNPOSTS; ANCHORAGE FOR ROPES, GUY WIRES, POWER LINES, OR OTHER SIMILAR FUNCTIONS.
    E. DUMPING OF POISONOUS MATERIALS ON OR AROUND TREES AND ROOTS. SUCH MATERIAL INCLUDES BUT IS NOT LIMITED TO PAINT, PETROLEUM PRODUCTS, CONTAMINATED WATER, OR OTHER DELETERIOUS MATERIALS.
    F. CUTTING OF TREE ROOTS BY UTILITY TRENCHING, FOUNDATION DIGGING, PLACEMENT OF CURBS AND TRENCHES, AND OTHER MISCELLANEOUS EXCAVATION WITHOUT PRIOR APPROVAL OF THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE.
    G. DAMAGE TO TRUNK, LIMBS, OR FOLIAGE CAUSED BY MANEUVERING VEHICLES.
    H. COMPACTION OF THE ROOT ZONE UNDER THE DRIPLINE BY THE MOVEMENT OF TRUCKS OR GRADING MACHINES; STORAGE OF EQUIPMENT, GRAVEL, EARTH FILL, OR CONSTRUCTION SUPPLIES, ETC.
    I. EXCESSIVE WATER OR HEAT FROM EQUIPMENT, UTILITY LINE CONSTRUCTION, OR BURNING OF TRASH UNDER OR NEAR SHRUBS OR TREES.
    J. DAMAGE TO ROOT SYSTEM FROM FLOODING, EROSION, AND EXCESSIVE WETTING AND DRYING RESULTING FROM DEWATERING AND OTHER OPERATIONS.
9. EXCAVATION AROUND TREES:
    A. EXCAVATION WITHIN DRIPLINES SHALL BE DONE ONLY WHERE ABSOLUTELY NECESSARY.
    B. WHEN TRENCHING FOR UTILITIES IS REQUIRED WITHIN DRIPLINES, TUNNELING UNDER AND AROUND ROOTS OR BRIDGING OVER THEM IS PREFERRED OVER ROOT SEVERANCE. MAIN BUTTRESS, OR SUPPORTIVE ROOTS, SHALL NOT BE CUT. SMALLER ROOTS THAT INTERFERE WITH INSTALLATION OF NEW WORK MAY BE CUT WITH PRIOR APPROVAL OF THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE.
    C. WHERE EXCAVATION FOR NEW CONSTRUCTION IS REQUIRED WITHIN DRIPLINES OF TREES, HAND EXCAVATION SHALL BE EMPLOYED TO MINIMIZE DAMAGE TO ROOT SYSTEMS. IF LARGE, MAIN LATERAL ROOTS ARE ENCOUNTERED, THEY SHALL BE EXPOSED BEYOND THE EXCAVATION LIMITS AS REQUIRED TO BEND AND RELOCATE THEM WITHOUT BREAKING. ANY ROOTS 2-INCHES OR LARGER WHICH MIGHT BE SEVERED WILL BE CLEANLY CUT BEHIND TORN ENDS TO ENHANCE THE EFFICIENT NATURAL "COMPARTMENTALIZATION" OF THE DAMAGE BY THE ROOTS. THERE IS NO NEED TO APPLY ANY TYPE OF "PRUNING SEAL" COMPOUND WHEN ROOTS ARE CLEANLY CUT, SINCE THE ROOT WILL FORM ITS OWN INTERNAL BARRIERS TO DECAY.
    D. EXPOSED ROOTS SHALL NOT BE ALLOWED TO DRY OUT BEFORE PERMANENT BACKFILL IS PLACED. TEMPORARY EARTH COVER SHALL BE PROVIDED, OR ROOTS SHALL BE PACKED WITH WET PEAT MOSS OR FOUR LAYERS OF WET, UNTREATED BURLAP, AND TEMPORARILY SUPPORTED AND PROTECTED FROM DAMAGE UNTIL PERMANENTLY COVERED WITH BACKFILL. THE COVER OVER THE ROOTS SHALL BE WETTED TO THE POINT OF RUNOFF DAILY.
10. TRIMMING OF TREES (WHEN INDICATED AS WORK INCLUDED IN CONTRACT, OR WHEN PRUNING IS REQUIRED AS AN APPROVAL HAS BEEN GRANTED BY THE OWNER TO ACCOMMODATE CONSTRUCTION):
    A. BRANCHES SHALL BE THINNED IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARDS INSTITUTE STANDARD PRACTICES FOR PRUNING (ANSI A300)
    B. THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE SHALL BE ENGAGED TO OVERSEE REMOVAL OF BRANCHES FROM TREES AND LARGE SHRUBS WHICH ARE TO REMAIN.
    C. IN THE CASE OF ROOT CUTS, APPLY WET BURLAP OR OTHER PROTECTION TO PREVENT DRYING OUT, AND MAINTAIN IN A MOIST CONDITION UNTIL PERMANENT BACKFILL IS IN PLACE.
11. SOIL COMPACTION MITIGATION:
    A. THE CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLING ANY ROOT BUFFER MATERIAL SUCH AS MULCH, GRAVEL, OR PLYWOOD. THE CONTRACTOR IS RESPONSIBLE FOR ITS MAINTENANCE TO ASSURE EFFECTIVENESS AGAINST SOIL COMPACTION.
12. REPAIR COMPENSATION:
    A. DAMAGE TO EXISTING CROWNS OR ROOTS OVER TWO (2) INCHES IN DIAMETER SHALL BE IMMEDIATELY REPORTED TO THE OWNER, IN WRITING, AND REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE BY THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE.
    B. THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE SHALL DIRECT THE REPAIR OF TREES DAMAGED BY CONSTRUCTION OPERATIONS. REPAIRS SHALL BE MADE PROMPTLY AFTER DAMAGE OCCURS TO PREVENT PROGRESSIVE DETERIORATION OF DAMAGED TREES.
    C. ANY TREE TO REMAIN WHICH IS DAMAGED OR DESTROYED OWING TO THE CONTRACTOR'S FAILURE TO PROVIDE ADEQUATE PROTECTION SHALL BE COMPENSATED FOR IN ACCORDANCE WITH THE GUIDELINES SET FORTH IN THE GUIDE FOR PLANT APPRAISAL, 9TH EDITION, USING THE TRUNK FORMULA METHOD.
        1. FOR TREES AND SHRUBS WITH DIAMETERS UP TO AND INCLUDING 6 INCHES, COMPENSATION SHALL BE THE ACTUAL COST OF REPLACEMENT WITH ITEM SIMILAR IN SPECIES, SIZE, AND SHAPE, INCLUDING, BUT NOT LIMITED TO:
            A. ACTUAL COST OF REPLACEMENT TREE.
            B. TRANSPORTATION OR DELIVER OF BOXED TREE TO SITE.
            C. PLANTING AND STAKING (OR GUYING).
            D. ESTABLISHMENT PERIOD MAINTENANCE FOR AT LEAST 90 DAYS, INCLUDING WATERING, PRUNING, PEST CONTROL, OR OTHER CARE TO BRING REPLACEMENT TO THE SAME GENERAL CONDITION OF THE ORIGINAL TREE.
    D. DAMAGED TREE LIMBS OR TREES WHICH HAVE DIED AS A RESULT OF INJURY DURING CONSTRUCTION SHALL REMAIN OR BE REMOVED BY THE CONTRACTOR AS DIRECTED BY THE OWNER OR ARBORIST OF RECORD.

MASTER CONSTRUCTION LEGEND

ITEM	DESCRIPTION	MANUFACTURER	MATERIAL/MODEL	COLOR	FINISH	NOTES	DETAIL
PAVING LEGEND							
P-1	CONCRETE PAVING (PEDESTRIAN)	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	PROVIDE 5'X5' SAMPLE	DETAIL A SHEET L1.51
P-2	CONCRETE PAVING (VEHICULAR)	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	SEE CIVIL FOR SUB-BASE	DETAIL E SHEET L1.51
P-3	CONCRETE BAND AT QUAD EDGE	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	-	DETAIL J SHEET L1.51
P-4	CONCRETE SAWCUT JOINT	-	-	-	-	-	DETAIL D SHEET L1.51
P-5	CONCRETE MOW CURB	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	-	DETAIL H SHEET L1.51
P-6	UNIT PAVERS	BELGARD 844.495.8210	MODULINE PAVER- 3x12" (60MM)	LINEN (LIGHTER GREY)	GROUND FACE	IN STOCK - RUNNING BOND PATTERN	DETAIL G SHEET L1.51
P-7	UNIT PAVERS	BELGARD 844.495.8210	MODULINE PAVER- 3x12" (60MM)	FOUNDRY (DARKER GREY)	GROUND FACE	IN STOCK - RUNNING BOND PATTERN	DETAIL G SHEET L1.51
P-8	DECOMPOSED GRANITE (STABILIZED)	SOUTHWEST BOULDER AND STONE - 714.882.1010	STABILIZED DECOMPOSED GRANITE	CALIFORNIA GOLD	-	DG AROUND TREES TO BE UNSTABILIZED WITHIN 24" OF TRUNK	DETAIL I SHEET L1.51
P-9	CONCRETE STAIRS - QUAD	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	-	DETAIL F SHEET L1.51
P-10	SLOPED CONCRETE WALKWAY	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	-	DETAIL A SHEET L1.51
P-11	JOINT AT NEW AND EXISTING CONCRETE	-	-	-	-	-	DETAIL N SHEET L1.51
WALLS AND FENCE LEGEND							
W-1	SEAT WALL AT QUAD STEPS	-	P.I.P. CONCRETE	NATURAL GREY	SMOOTH TROWEL FINISH WITH ACID ETCH	MAKE SINGLE 12X12 CUBE MOCKUP FOR APPROVAL OF BENCHWALL FINISH. STRIP FORMS AND FINISH, NO SACKING ACCEPTED.	DETAIL P SHEET L1.51
W-2	RETAINING WALL AT WHEELCHAIR SPACE AT AMPHITHEATER	-	P.I.P. CONCRETE	NATURAL GREY	SMOOTH TROWEL FINISH WITH ACID ETCH	WITH SKATE DETERRENT: HEMI GRINDERMINDER	DETAILS F/L1.52 & G/L1.53
W-3	CHAINLINK FENCE	-	9 GAUGE, 2" OPENING	-	GALVANIZED	-	DETAIL L SHEET L1.52
W-4	CHAINLINK GATE FOR EMERGENCY ACCESS	-	9 GAUGE, 2" OPENING	-	GALVANIZED	-	DETAIL D SHEET L1.52
W-5	RETAINING WALL AT SLOPED WALK	-	P.I.P. CONCRETE	NATURAL GREY	SMOOTH TROWEL FINISH WITH ACID ETCH	MAKE SINGLE 12X12 CUBE MOCKUP FOR APPROVAL OF BENCHWALL FINISH. STRIP FORMS AND FINISH, NO SACKING ACCEPTED.	DETAIL P SHEET L1.52
SITE AMENITIES LEGEND							
SA-1	CONCRETE BENCHES - ENTRY COURTYARD	-	P.I.P. CONCRETE	NATURAL GREY	SMOOTH TROWEL FINISH WITH ACID ETCH	WITH SKATE DETERRENT: HEMI GRINDERMINDER	DETAILS E & L SHEET L1.53
SA-2	CONCRETE BENCHES - AMPHITHEATER	-	P.I.P. CONCRETE	NATURAL GREY	SMOOTH TROWEL FINISH WITH ACID ETCH	MAKE SINGLE 12X12 CUBE MOCKUP FOR APPROVAL OF BENCHWALL FINISH. STRIP FORMS AND FINISH, NO SACKING ACCEPTED.	DETAIL G SHEET L1.52
SA-3	CASUAL CHAIR	MMCITE 267-300-6995	LIMPIDO LLP235	TBD	-	TO BE BOLTED PER MANUF. RECOMMENDATIONS. CONTRACTOR TO SUBMIT SHOP DRAWING	-
SA-4	CHALKBOARD AT OUTDOOR CLASSROOM	PLATINUM VISUAL SYSTEMS ELISIA GUIDO: 951.817.2222	4'X8' WRITANIUM CHALKBOARD	BLACK	-	DROP-IN-TRAY SYSTEM, ALUMIN. FRAME CORE MTRL TO BE CEMENTITIOUS NOT PARTICLE BOARD	DETAIL O SHEET L1.52
SA-5	PRECAST TABLE AND BENCHES	QCP 866-703-3434	GROOVE - Q-GROOVE-72T	NATURAL	POLISHED	-	DETAIL A & D SHEET L1.54
SA-6	PRECAST TABLE AND CHAIRS	QCP 866-703-3434	BOX - Q-BOX-32T	NATURAL	POLISHED	-	DETAIL B & E SHEET L1.54
SA-7	NOT USED	-	-	-	-	-	-
SA-8	TREE GRATE	URBAN ACCESSORIES, DISTRIB. BY SPRUCE & GANDER 760-690-4083	CASCADE 4X8 GREY IRON (STANDARD)		RAW (STANDARD)	FRAME ON 3 SIDES ABUTTING CONCRETE, NO FRAME ON SIDE ABUTTING PA. CENTER OPENING TO BE CUT TO 20" WIDTH PRIOR TO INSTALLATION.	DETAIL H SHEET L1.53
SA-9	HANDRAIL	-	STAINLESS STEEL	BRUSHED	-	-	DETAIL P SHEET L1.51
SA-10	NOT USED	-	-	-	-	-	-
SA-11	SLOPED TURF	-	-	-	-	-	-
SA-12	BIKE RACK	FORMS AND SURFACES 800-451-0410	OLYMPIA	ALUMINUM TEXTURE	-	INSTALL PER MANUFACTURER'S SPECIFICATIONS	DETAIL B SHEET L1.53
SA-13	BENCH (NO BACK)	MMCITE 267-300-6995	LIMPIDO LLP226	TBD FROM MFR STANDARD COLOR SELECTIONS	-	TO BE BOLTED PER MANUF. RECOMMENDATIONS. CONTRACTOR TO SUBMIT SHOP DRAWING	DETAIL C SHEET L1.54
SA-14	BENCH (WITH BACK)	MMCITE 267-300-6995	LIMPIDO LLP256	TBD FROM MFR STANDARD COLOR SELECTIONS	-	TO BE BOLTED PER MANUF. RECOMMENDATIONS. CONTRACTOR TO SUBMIT SHOP DRAWING	DETAIL F SHEET L1.54
SA-15	WHEELCHAIR SPACE AND ACCESSIBLE SURFACE AT OUTDOOR TABLE	QCP 866-703-3434	GROOVE - Q-GROOVE-72T BOX - Q-BOX-32T	NATURAL	-		DETAILS D & E, SHEET L1.54
SA-16	WHEELCHAIR SPACE AND COMPANION SEATING	-	-	-	-	-	DETAIL M SHEET L1.51

REFERENCE LEGEND

1	EXISTING FENCE, PROTECT IN PLACE
2	EXISTING DOUBLE SWING FIRE ACCESS GATE, PROTECT IN PLACE
3	EXISTING FIRE LANE, PROTECT IN PLACE
4	EXISTING PROMENADE/FIRE LANE, PROTECT IN PLACE
5	EXISTING PLANTING AREA, PROTECT IN PLACE
6	PARKING LOT, PROTECT IN PLACE
7	EXISTING CONCRETE PATH
8	EXISTING SIDEWALK, PROTECT IN PLACE
9	EXISTING TREE, PROTECT IN PLACE
10	BUILDING OVERHANG
11	RAISED PLANTER - SEE A10.14 & A10.17
12	CONCRETE PAD FOR TRANSFORMER - SEE S8.60
13	RAIN GARDENS PER CIVIL
14	GRAVEL BANDS - SEE PLANTING SHEETS
15	GRAVEL MAINTENANCE STRIP - SEE PLANTING SHEETS
16	GRAVEL FOR INTERIOR PLANTERS - SEE PLANTING LEGEND AND ARCHITECTURE DETAILS
17	STEEL HEADER - SURE-LOC 1" THICK, UNPAINTED
18	BOULDERS - SEE PLANTING SHEETS FOR COLOR, QTY, SIZE
19	GRAVEL FIRE LANE EXTENSION - PER CIVIL
20	EMERGENCY BLUEPHONE
21	SITE LIGHTING FIXTURE - SEE E0.03 & E1.22
22	GRAVEL MULCH - SEE PLANTING LEGEND

ABBREVIATION AND SYMBOL LEGEND

CL	CENTER LINE
PA	PLANTING AREA
TYP.	TYPICAL
F.O.B.	FACE OF BUILDING
—●—	STEP

AGENCY APPROVAL:

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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

MASTER CONSTRUCTION SCHEDULE AND NOTES

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

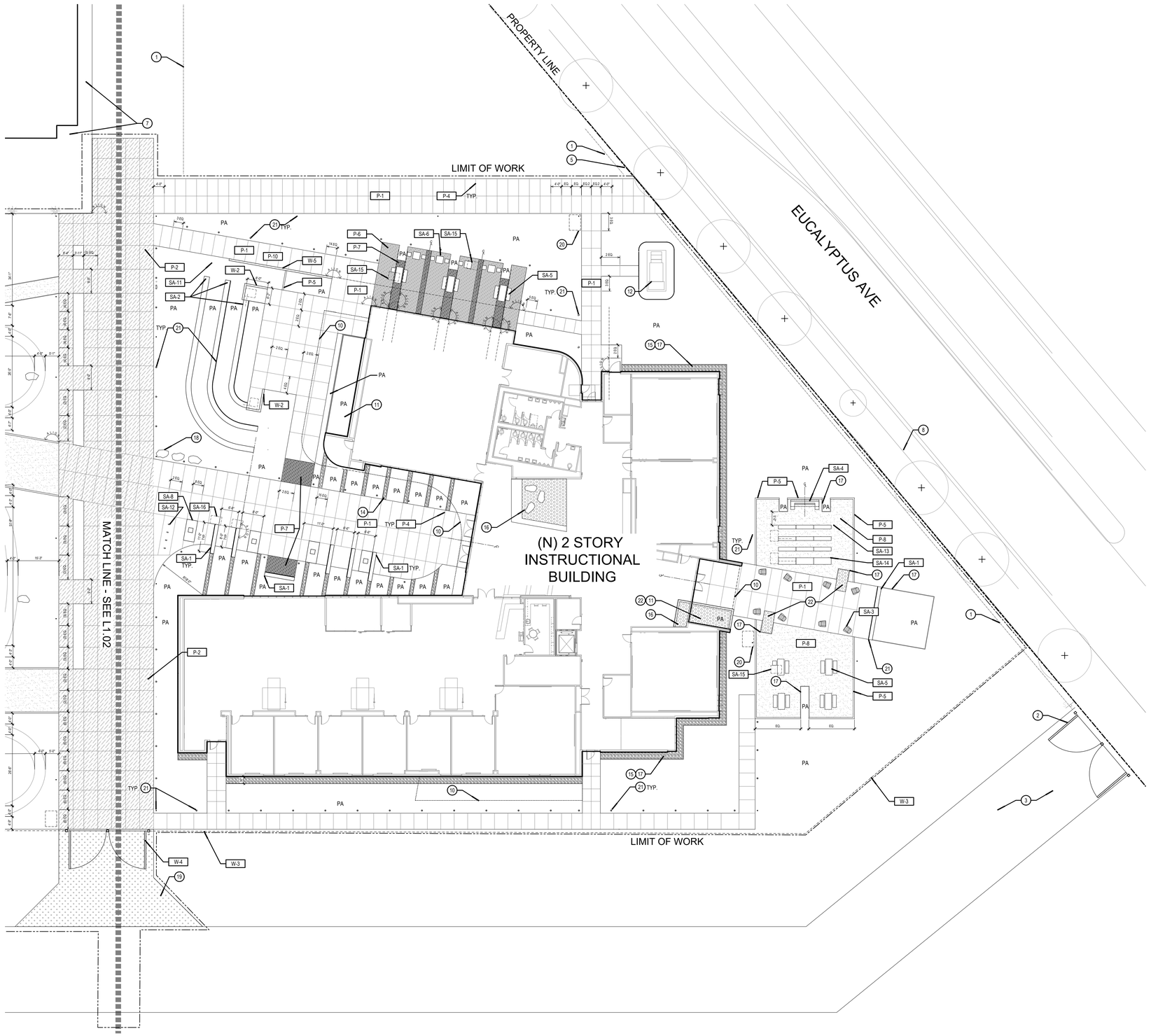
L1.00

2/13/2020 3:47:43 PM

MASTER CONSTRUCTION SCHEDULE AND NOTES

PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH (ONE .4" TRIM) WHEN PRINTED ON 24" BY 36"



PAVING LEGEND

FOR MATERIALS, COLORS, FINISHES AND MODELS, SEE MASTER CONSTRUCTION LEGEND, SHEET L1.00

ITEM	DESCRIPTION	DETAIL
P-1	CONCRETE PAVING (PEDESTRIAN)	DETAIL A SHEET L1.51
P-2	CONCRETE PAVING (VEHICULAR)	DETAIL E SHEET L1.51
P-3	CONCRETE BAND AT QUAD EDGE	DETAIL J SHEET L1.51
P-4	CONCRETE SAWCUT JOINT	DETAIL D SHEET L1.51
P-5	CONCRETE MOW CURB	DETAIL H SHEET L1.51
P-6	UNIT PAVERS	DETAIL G SHEET L1.51
P-7	UNIT PAVERS	DETAIL G SHEET L1.51
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P-10	SLOPED CONCRETE WALKWAY	DETAIL A SHEET L1.51
P-11	JOINT AT NEW & EXISTING CONCRETE	DETAIL N SHEET L1.51

WALL & FENCE LEGEND

W-1	SEAT WALL AT QUAD STEPS	DETAIL P SHEET L1.51
W-2	RETAINING WALL AT WHEELCHAIR SPACE AT AMPHITHEATER	DETAILS F/L1.52 & G/L1.53
W-3	CHAINLINK FENCE	DETAIL L SHEET L1.52
W-4	CHAINLINK GATE FOR EMERGENCY ACCESS	DETAIL D SHEET L1.52
W-5	RETAINING WALL AT SLOPED WALK	DETAIL P SHEET L1.52

SITE AMENITIES LEGEND

SA-1	CONCRETE BENCHES - ENTRY COURTYARD	DETAILS E & G SHEET L1.53
SA-2	CONCRETE BENCHES - AMPHITHEATER	DETAIL G SHEET L1.52
SA-3	CASUAL CHAIR	-
SA-4	CHALKBOARD AT OUTDOOR CLASSROOM	DETAIL O SHEET L1.52
SA-5	PRECAST TABLE AND BENCHES	DETAIL A & D SHEET L1.54
SA-6	PRECAST TABLE AND CHAIRS	DETAIL B & E SHEET L1.54
SA-7	NOT USED	-
SA-8	TREE GRATE	DETAIL H SHEET L1.53
SA-9	HANDRAIL	DETAIL P SHEET L1.51
SA-10	NOT USED	-
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SA-12	BIKE RACK	DETAIL B SHEET L1.53
SA-13	BENCH (NO BACK)	DETAIL C SHEET L1.54
SA-14	BENCH (WITH BACK)	DETAIL F SHEET L1.54
SA-15	WHEELCHAIR SPACE ACCESSIBLE SURFACE AT OUTDOOR TABLE	DETAILS D & E, SHEET L1.54
SA-16	WHEELCHAIR SPACE AND COMPANION SEATING	DETAIL M SHEET L1.51

REFERENCE LEGEND

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6	PARKING LOT, PROTECT IN PLACE
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14	GRAVEL BANDS - SEE PLANTING SHEETS
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16	GRAVEL FOR INTERIOR PLANTERS - SEE PLANTING LEGEND AND ARCHITECTURE DETAILS
17	STEEL HEADER (SURE-LOC ¼" THICK, UNPAINTED) Δ
18	BOULDERS - SEE PLANTING SHEETS FOR COLOR, QTY, SIZE
19	GRAVEL FIRE LANE EXTENSION - PER CIVIL
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22	GRAVEL MULCH - SEE PLANTING LEGEND

ABBREVIATION AND SYMBOL LEGEND

CL	CENTER LINE
PA	PLANTING AREA
TYP.	TYPICAL
F.O.B.	FACE OF BUILDING
	STEP

REFER TO SHEET L1.00 FOR MASTER CONSTRUCTION SCHEDULES AND NOTES

0 4 8 16 32 Feet

Scale: 1/16" = 1'-0"

CONSTRUCTION PLAN ENLARGEMENT

AGENCY APPROVAL:

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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

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5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

CONSTRUCTION PLAN ENLARGEMENT

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

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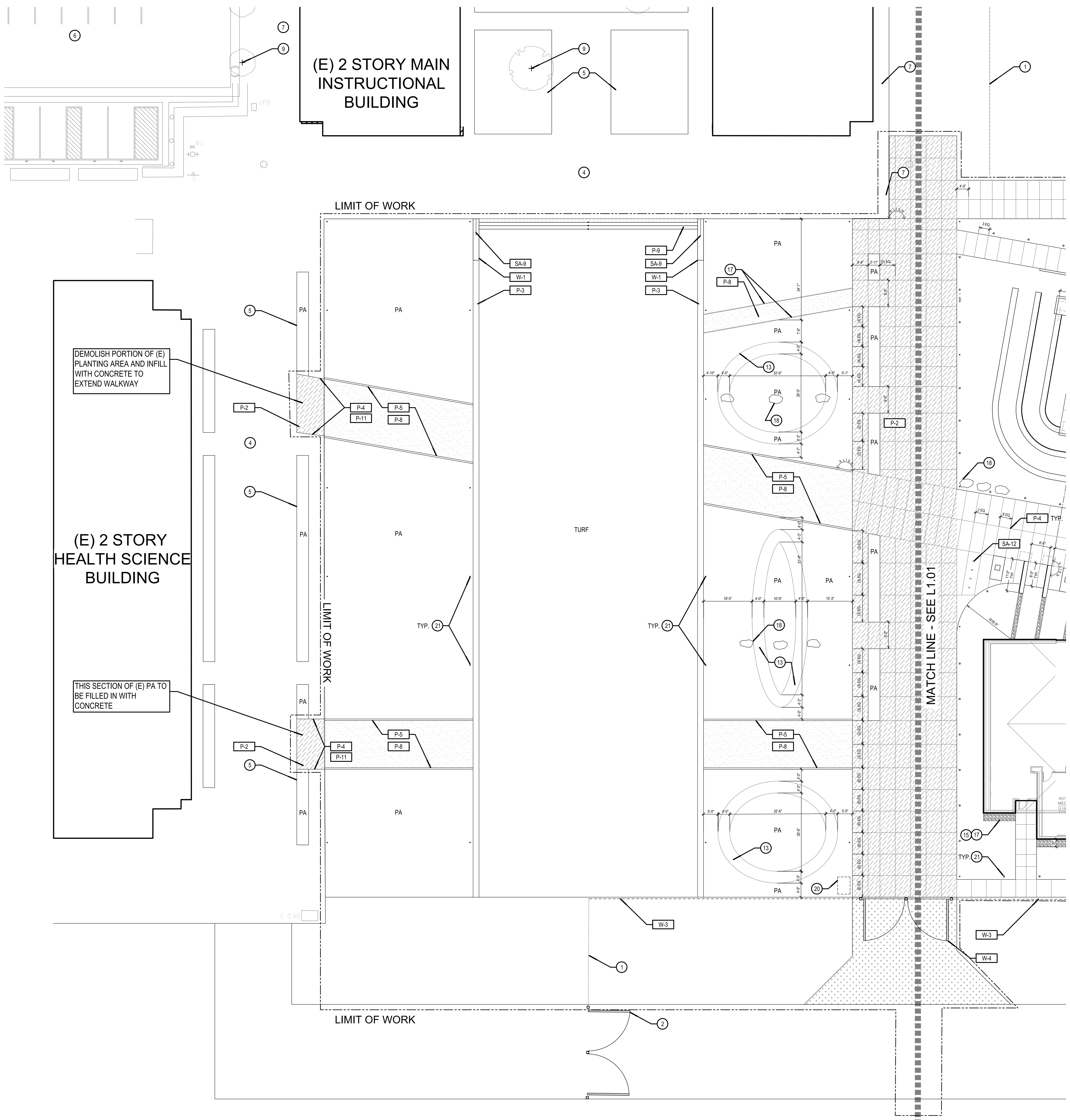
PLEASE RECYCLE



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SITE AMENITIES LEGEND

SA-1	CONCRETE BENCHES - ENTRY COURTYARD	DETAILS E & G SHEET L1.53
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SA-4	CHALKBOARD AT OUTDOOR CLASSROOM	DETAIL O SHEET L1.52
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SA-11	SLOPED TURF	-
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SA-13	BENCH (NO BACK)	DETAIL C SHEET L1.54
SA-14	BENCH (WITH BACK)	DETAIL F SHEET L1.54
SA-15	WHEELCHAIR SPACE ACCESSIBLE SURFACE AT OUTDOOR TABLE	DETAILS D & E, SHEET L1.54
SA-16	WHEELCHAIR SPACE AND COMPANION SEATING	DETAIL M SHEET L1.51

REFERENCE LEGEND

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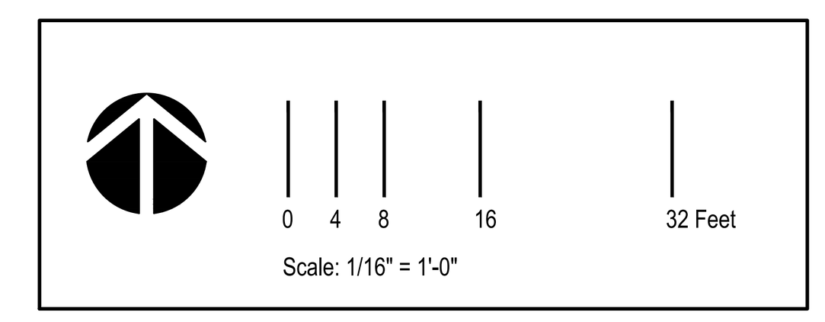
3	EXISTING FIRE LANE, PROTECT IN PLACE
4	EXISTING PROMENADE/FIRE LANE, PROTECT IN PLACE
5	EXISTING PLANTING AREA, PROTECT IN PLACE
6	PARKING LOT, PROTECT IN PLACE
7	EXISTING CONCRETE PATH
8	EXISTING SIDEWALK, PROTECT IN PLACE
9	EXISTING TREE, PROTECT IN PLACE
10	BUILDING OVERHANG
11	RAISED PLANTER - SEE A10.14 & A10.17
12	CONCRETE PAD FOR TRANSFORMER - SEE S8.60
13	RAIN GARDENS PER CIVIL
14	GRAVEL BANDS - SEE PLANTING SHEETS
15	GRAVEL MAINTENANCE STRIP - SEE PLANTING SHEETS
16	GRAVEL FOR INTERIOR PLANTERS - SEE PLANTING LEGEND AND ARCHITECTURE DETAILS
17	STEEL HEADER SURE-LOC $\frac{1}{4}$" THICK, UNPAINTED (2)
18	BOULDERS - SEE PLANTING SHEETS FOR COLOR, QTY, SIZE
19	GRAVEL FIRE LANE EXTENSION - PER CIVIL
20	EMERGENCY BLUEPHONE
21	SITE LIGHTING FIXTURE - SEE E0.03 & E1.22
22	GRAVEL MULCH - SEE PLANTING LEGEND

ABBREVIATION AND SYMBOL LEGEND

CL	CENTER LINE
PA	PLANTING AREA
TYP.	TYPICAL
F.O.B.	FACE OF BUILDING
—●—	STEP

REFER TO SHEET L1.00 FOR MASTER CONSTRUCTION SCHEDULES AND NOTES



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DESCRIPTION	DATE
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PROJECT:
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SHEET NAME:
CONSTRUCTION PLAN ENLARGEMENT

ADDENDUM #2

FILE NO.: 36-C1 | A#: 04-119722
DATE: 06.17.2021 | CLIENT PROJ NO:
SHEET:

L1.02

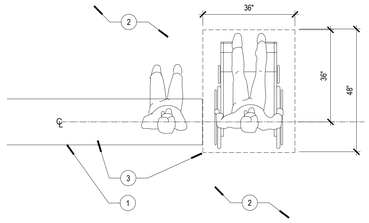
CONSTRUCTION PLAN ENLARGEMENT

2/13/2020 3:47:43 PM

PLEASE RECYCLE

THE LINE BROKEN ABOVE IS EXACTLY 36" WHEN PLOTTED AT FULL SIZE
IF NOT, THIS DRAWING IS NOT TO SCALE

1. CONCRETE BENCH PER DETAIL E/L1.53
2. ADJACENT CONCRETE PAVING PER PLAN
3. WHEELCHAIR SPACE AND COMPANION SEAT PER ADA. SHOULDER ALIGNMENT

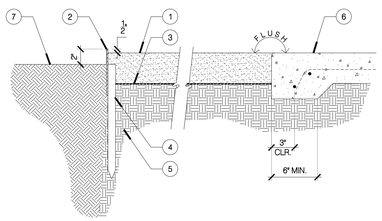


M Wheelchair Space and Companion Seating

Scale: 1/2" = 1'-0"

1. 3" THICK LAYER OF STABILIZED DECOMPOSED GRANITE PAVING, INSTALL IN LIFTS
2. STEEL EDGING PER PLAN. SEE REFERENCE LEGEND/L1.00 FOR MORE INFORMATION
3. MIRAFI FILTER FABRIC
4. STEEL STAKES PER EDGING MANUFACTURER
5. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
6. ADJACENT CONCRETE PAVING
7. ADJACENT PLANTING AREA

NOTES:
A. REFER TO MASTER CONSTRUCTION LEGEND FOR ADDITIONAL INFORMATION.
B. DECOMPOSED GRANITE PAVING AROUND TREES SHOULD BE UNSTABILIZED WITHIN 24" OF THE TREE TRUNK TO ALLOW WATER PERCOLATION AND AIR TO ROOTS

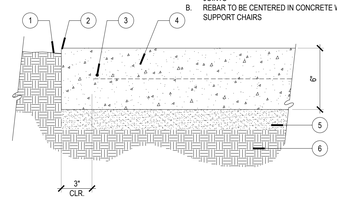


I Decomposed Granite

Scale: 1-1/2"=1'-0"

1. FINISH GRADE:
   -½" BELOW F.S. FOR LANDSCAPE AREAS
2. ¾" RADIUS AT EDGE OF PAVING.
3. REBAR SIZE AND SPACING PER CIVIL DRAWINGS. SEE DETAIL 2/C9.00
4. CONCRETE PAVING - SEE CONSTRUCTION LEGEND FOR COLOR AND FINISH
5. SUBBASE PER CIVIL DRAWINGS AND GEOTECHNICAL REPORT
6. SUBGRADE COMPACTED PER CIVIL DRAWINGS AND GEOTECHNICAL REPORT

NOTES:
A. SEE CONSTRUCTION PLAN FOR LOCATION OF JOINTS
B. REBAR TO BE CENTERED IN CONCRETE WITH SUPPORT CHAIRS

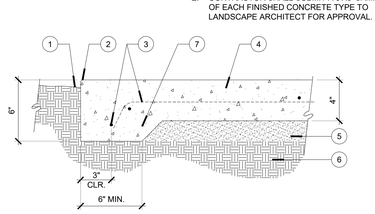


E Concrete Paving - Vehicular

Scale: 2"=1'-0"

1. FINISH GRADE:
   -½" BELOW F.S. FOR PLANTING AREAS
2. ¾" RADIUS
3. REBAR SIZE AND SPACING PER GEOTECHNICAL REPORT RECOMMENDATIONS FOR PAVEMENT
4. CONCRETE PAVING. SEE CONSTRUCTION LEGEND FOR COLOR AND FINISH
5. SUBBASE PER GEOTECHNICAL REPORT
6. SUBGRADE COMPACTED PER GEOTECHNICAL REPORT
7. THICKENED EDGE

NOTES:
A. SEE CONSTRUCTION PLAN FOR SCORE JOINT LOCATIONS
B. CONTRACTOR TO PROVIDE SHOP DRAWING DETAILING CONSTRUCTION JOINT LAYOUT PLAN TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO POURING CONCRETE HARDSCAPE.
C. INSTALL EXPANSION JOINTS BETWEEN NEW CONCRETE PAVING AND VERTICAL SURFACES, INCLUDING CONCRETE SEATWALLS, BUILDINGS, ETC. SEE DETAIL C, THIS SHEET.
D. REBAR TO BE CENTERED IN CONCRETE WITH SUPPORT CHAIRS
E. CONTRACTOR SHALL SUBMIT A 5'X5' SAMPLE OF EACH FINISHED CONCRETE TYPE TO LANDSCAPE ARCHITECT FOR APPROVAL.

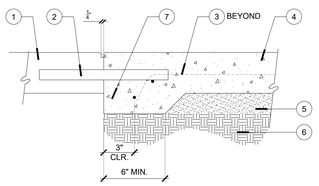


A Concrete Paving - Pedestrian

Scale: 2"=1'-0"

1. EXISTING CONCRETE
2. DRILL INTO EXISTING SLAB TO EMBED 18" DOWEL (9" EMBED) @ 12" O.C.
3. REBAR SIZE AND SPACING PER GEOTECHNICAL REPORT RECOMMENDATIONS FOR PAVEMENT
4. VEHICULAR CONCRETE PAVING, SEE DETAIL 2/C9.00. SEE CONSTRUCTION LEGEND FOR COLOR AND FINISH
5. SUBBASE PER GEOTECHNICAL REPORT
6. SUBGRADE COMPACTED PER GEOTECHNICAL REPORT
7. THICKENED EDGE

NOTES:
A. SEE CONSTRUCTION PLAN FOR CONSTRUCTION AND SCORE JOINT LOCATIONS
B. CONTRACTOR TO PROVIDE SHOP DRAWING DETAILING CONSTRUCTION JOINT AND SCORE JOINT LAYOUT PLAN TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO POURING CONCRETE HARDSCAPE. SEE DETAILS B AND C, THIS SHEET.
C. INSTALL EXPANSION JOINTS BETWEEN NEW CONCRETE PAVING AND VERTICAL SURFACES, INCLUDING CONCRETE SEATWALLS, BUILDINGS, ETC. SEE DETAIL D, THIS SHEET.
D. REBAR TO BE CENTERED IN CONCRETE WITH SUPPORT CHAIRS

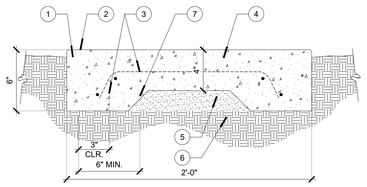


N Construction Joint at Existing Concrete

Scale: 2"=1'-0"

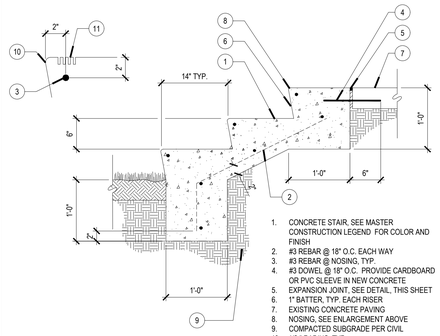
1. FINISH GRADE:
   -½" BELOW F.S. FOR PLANTING AREAS
2. ⅜" RADIUS
3. REBAR SIZE AND SPACING PER CIVIL
4. CONCRETE PAVING. SEE CONSTRUCTION LEGEND FOR COLOR AND FINISH
5. SUBBASE PER GEOTECHNICAL REPORT
6. SUBGRADE COMPACTED PER GEOTECHNICAL REPORT
7. THICKENED EDGE

NOTES:
A. SEE CONSTRUCTION PLAN FOR SCORE JOINT LOCATIONS
B. CONTRACTOR TO PROVIDE SHOP DRAWING DETAILING CONSTRUCTION JOINT LAYOUT PLAN TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO POURING CONCRETE HARDSCAPE.
C. INSTALL EXPANSION JOINTS BETWEEN NEW CONCRETE PAVING AND VERTICAL SURFACES, INCLUDING CONCRETE SEATWALLS, BUILDINGS, ETC. SEE DETAIL C, THIS SHEET.
D. REBAR TO BE CENTERED IN CONCRETE WITH SUPPORT CHAIRS
E. CONTRACTOR SHALL SUBMIT A 5'X5' SAMPLE OF EACH FINISHED CONCRETE TYPE TO LANDSCAPE ARCHITECT FOR APPROVAL.



J Concrete Band @ Quad Edge

Scale: 2"=1'-0"



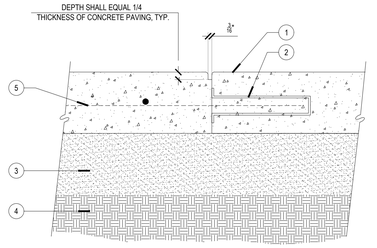
1. CONCRETE STAIR, SEE MASTER CONSTRUCTION LEGEND FOR COLOR AND FINISH
2. #3 REBAR @ 18" O.C. EACH WAY
3. #3 REBAR @ NOSING, TYP.
4. #3 DOWEL @ 18" O.C. PROVIDE CARDBOARD OR PVC SLEEVE IN NEW CONCRETE
5. EXPANSION JOINT, SEE DETAIL, THIS SHEET
6. 1" BATTER, TYP. EACH RISER
7. EXISTING CONCRETE PAVING
8. NOSING, SEE ENLARGEMENT ABOVE
9. COMPACTED SUBGRADE PER CIVIL
10. 1/2 " RADIUS, TYP.
11. FOUR 1/8" WIDE x 1/4" DEEP SCORE LINES, APPLY CONTRASTING COLOR ON ALL STEPS AND UPPER APPROACH

NOTES:
A. INSTALL HANDRAILS PER PLAN. SEE DETAIL P THIS SHEET.

F Concrete Stairs - Quad

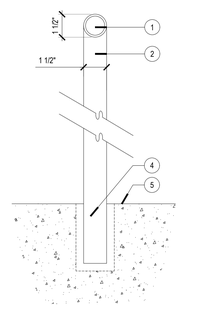
Scale: 1"=1'-0"

1. CONCRETE PAVING, PER PLAN
2. SPEED DOWELS, 18" LONG (9" EMBED) @ 12" O.C.
3. SUBBASE PER GEOTECHNICAL REPORT
4. SUBGRADE COMPACTED PER GEOTECHNICAL REPORT
5. REBAR SIZE AND SPACING PER CIVIL

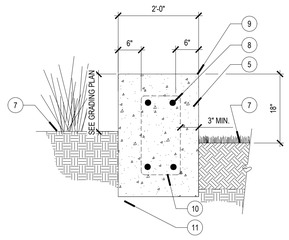


B Construction Joint

Scale: 3"=1'-0"



Section through handrail and post
NTS



Section through seat wall

1. 1-1/2" DIAMETER TUBULAR STEEL HANDRAIL.
2. 1-1/2" DIAMETER TUBULAR STEEL POSTS, GRIND SMOOTH AT RAIL.
3. STAIRS PER PLAN AND PER DETAIL F, THIS SHEET
4. CORE DRILL 4" DIAMETER HOLE (IN EXISTING CONCRETE AT NORTH AND IN SEAT WALL AT SOUTH) AND SET HANDRAIL POST WITH POR-ROK
5. POURED IN PLACE CONCRETE SEAT WALL. COLOR & FINISH PER MASTER CONSTRUCTION LEGEND. PITCH TOP TO DRAIN.
6. EXPANSION JOINT, ±5' O.C., TYPICAL. SPREAD EQUALLY ACROSS LENGTH OF WALL.
7. ADJACENT PLANTING AREA PER PLAN
8. NO. 4 REBAR, CONTINUOUS
9. 1/2" RADIUS, TYPICAL
10. NO. 4 REBAR AT 12" O.C. WITH ALTERNATE BENDS IN FOOTING
11. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT

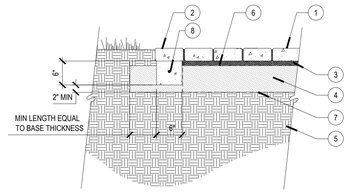
NOTES
A. STEEL FINISH TO BE BRUSHED

P Seat Wall and Handrail at Quad Steps

Scale: 3/4" = 1'-0"

1. CONCRETE PAVERS, 60MM MINIMUM THICKNESS
2. CAST IN PLACE CONCRETE CURB WITH POLYMER OR MORTAR ADHERED PAVER ON TOP. PROVIDE MIN 1" OVERHANG ON EACH SIDE
3. 1" BEDDING LAYER, CONFORMS TO ASTM C33 WITH <1% PASSING 0.080 MM
4. MINIMUM 4" AGGREGATE BASE LAYERED AND COMPACTED PER GEOTECHNICAL REPORT
5. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
6. GEOTEXTILE. 12" WIDE AT ALL PERIMETERS, TURN UP AGAINST CURB
7. OPTIONAL GEOTEXTILE SEPARATION FABRIC ON ENTIRE BOTTOM OF AGGREGATE BASE (EXTENDS BEYOND CURB)
8. #4 REBAR, CENTERED IN CURB

NOTES:
A. CONTRACTOR SHALL INSTALL PAVERS PER MANUFACTURE'S SPECIFICATIONS.

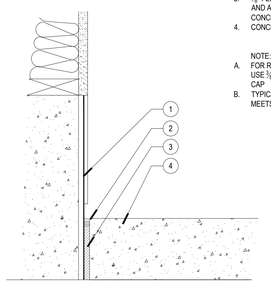


G Unit Pavers

Scale: 1" = 1'-0"

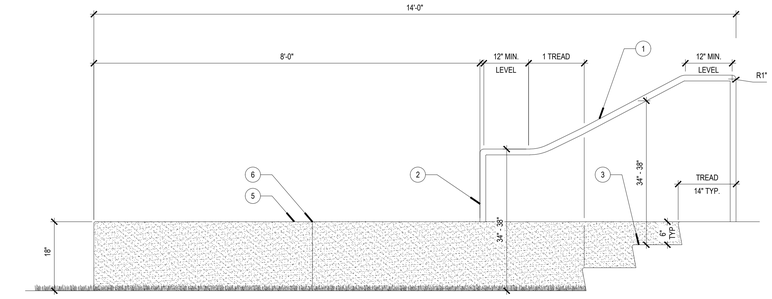
1. ADJACENT BUILDING, STEPS OR WALL
2. ½" TOOLED RADIUS - TYP.
3. ½" FELT EXPANSION JOINT WITH JOINT CAP AND APPROVED MASTIC SEALANT TO MATCH CONCRETE COLOR TYP.
4. CONCRETE PAVING PER PLAN

NOTE:
A. FOR RADIUS OR IRREGULAR JOINT LAYOUT - USE ¾" THICK FOAM JOINT WITH TEAR AWAY CAP
B. TYPICAL DETAIL WHERE CONCRETE PAVING MEETS VERTICAL SURFACES



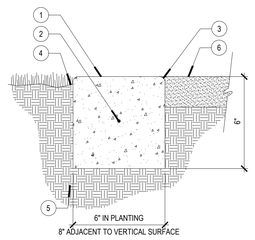
C Vertical Expansion Joint

Scale: 3"=1'-0"



1. CONCRETE MOWCURB, SEE CONSTRUCTION LEGEND FOR COLOR AND FINISH
2. REBAR PER CIVIL
3. ¾" RADIUS, TYP.
4. FINISH GRADE:
   -½" BELOW F.S. FOR TURF AREAS
   -1½" BELOW F.S. FOR SHRUB AREAS
5. COMPACTED SUBGRADE PER CIVIL
6. DECOMPOSED GRANITE, PER MASTER CONSTRUCTION LEGEND

NOTES:
A. PROVIDE A 1" DEEP SCORE JOINT AT 10' O.C. AND AT ALL CHANGES IN DIRECTION.
B. REBAR TO BE CENTERED IN CONCRETE WITH MIN. 18" TIED END OVERLAPS.



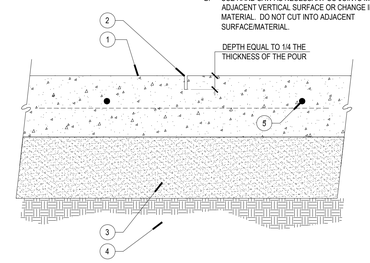
H Concrete Mowcurb

Scale: 3"=1'-0"

1. CONCRETE PAVING PER PLAN
2. ¾" SAWCUT JOINT
3. SUBBASE PER GEOTECHNICAL REPORT
4. SUBGRADE COMPACTED PER GEOTECHNICAL REPORT
5. REBAR SIZING AND SPACING PER CIVIL DRAWINGS

NOTES:
A. SEE CONSTRUCTION PLAN FOR LOCATION OF SAWCUT JOINTS.
B. USE HAND SAW AS NECESSARY SO JOINTS MEET ADJACENT VERTICAL SURFACE OR CHANGE IN MATERIAL. DO NOT CUT INTO ADJACENT SURFACE/MATERIAL.

DEPTH EQUAL TO 1/4 THE THICKNESS OF THE POUR



D Sawcut Joint

Scale: 3" = 1'-0"

AGENCY APPROVAL:

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NOT FOR CONSTRUCTION

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT

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PASADENA, CA 91101
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FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

CONSTRUCTION DETAILS

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

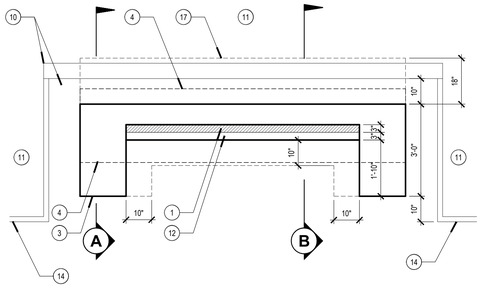
SHEET:

L1.51

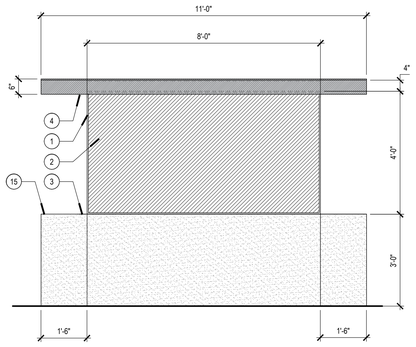
2/15/2022 3:47:43 PM

PLEASE RECYCLE

THE LINE BROKEN ABOVE IS EXACTLY 1" WHEN PLOTTED AT THIS SHEET'S ORIGINAL IMAGE SIZE



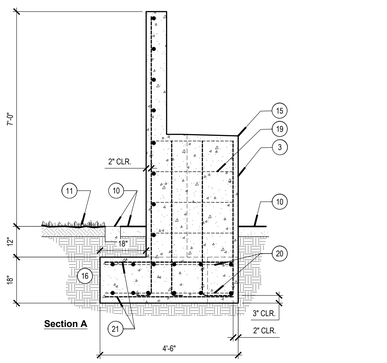
Plan



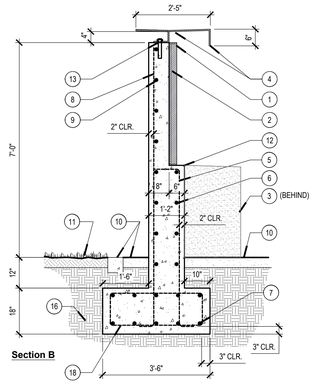
Elevation

1. 3" x ½" THICK STAINLESS STEEL CHALKBOARD FRAME
2. 4' X 8' WRITANIUM MAGNETIC CHALKBOARD ADHERED TO CONCRETE SURFACE AS RECOMMENDED BY MANUFACTURER FOR PROJECT CONDITIONS - PORCELAIN ENAMEL FINISH FUSED TO 28 GAUGE STAINLESS STEEL SHEET, CEMENT CORE, ALUMINUM BACKING
3. POURED IN PLACE CONCRETE WALL WITH SMOOTH FINISH
4. ½" THICK STAINLESS STEEL RAIN GUARD, SLOPED TO BACK TO DRAIN
5. #5 REBAR @ 12" O.C., VERTICAL
6. #5 REBAR @ 12" O.C., HORIZONTAL
7. (5) #4 MIN REBAR TOP AND BOTTOM, EVENLY DISTRIBUTED ALONG FOOTING
8. #6 REBAR @ 12" O.C., VERTICAL
9. #6 REBAR @ 12" O.C., HORIZONTAL
10. ADJACENT PAVING PER PLAN
11. PLANTING AREA PER PLAN
12. CONCRETE LEDGE
13. BOLT L-BRACKET WITH ¾" DIA. KWIK BOLT TZ (OR EQUAL) ANCHORS @ 16" O.C., EMBED 5-1/2" MIN., THEN WELD WEATHERGUARD TOP TO L-BRACKET
14. STEEL HEADER PER PLAN
15. ½" RADIUS AT ALL CORNERS, TYPICAL
16. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
17. FOOTING
18. #5 REBAR @ 12" O.C. TOP & BOTTOM
19. #5 REBAR HORIZONTAL @ 12" E.F.
20. (6) #4 MIN REBAR TOP AND BOTTOM - INCLUDING CONTINUOUS REBAR FROM BEYOND
21. (2) #5 FOOTING REINFORCEMENT, TOP AND BOTTOM

NOTES:
A. TOPS OF WALLS AND LEDGE TO SLOPE TO DRAIN.
B. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL BY LANDSCAPE ARCHITECT PRIOR TO CONSTRUCTION.
C. CONTRACTOR TO INSTALL CHALKBOARD PER THE DIMENSIONS INDICATED IN THE DETAIL. ALTHOUGH MANUFACTURER PROVIDES COMPLETE CHALKBOARD SYSTEMS, CONTRACTOR WILL ONLY NEED TO PURCHASE CHALKBOARD SURFACE. INSTALL CHALKBOARD SURFACE PER MANUFACTURER SPECIFICATIONS.
D. CONCRETE TO BE 3000 PSI MINIMUM.
E. SEE MASTER CONSTRUCTION LEGEND FOR MORE INFORMATION.
F. REFER TO DSA BACK CHECK STRUCTURAL CALCULATIONS



Section A



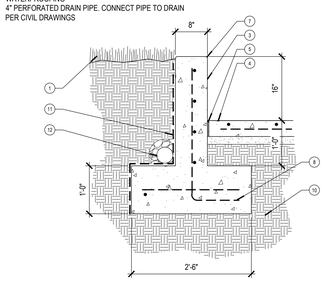
Section B

O Chalkboard Wall

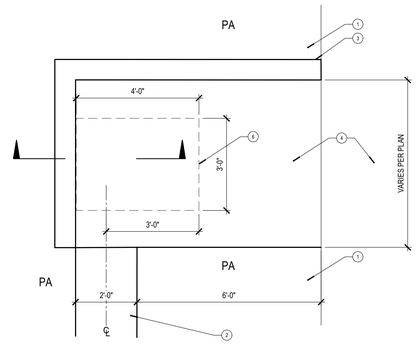
Scale: 1/2" = 1'-0"

1. TURF PER PLANTING PLAN
2. CAST IN PLACE CONCRETE AMPHITHEATER SEAT WALL, SEE DETAIL G THIS SHEET
3. CAST IN PLACE CONCRETE RETAINING WALL
4. PAVING PER PLAN
5. VERTICAL EXPANSION JOINT SEE DETAIL C, SHEET L1.51
6. WHEELCHAIR SPACE WITH SHOULDER ALIGNMENT TO COMPANION SEATING
7. 1/2" RADIUS AT ALL CORNERS, TYP.
8. #4 REBAR AT 12" O.C.E.W.
9. CONCRETE BENCHES, SEE DETAIL G, THIS SHEET
10. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
11. WATERPROOFING
12. 4" PERFORATED DRAIN PIPE. CONNECT PIPE TO DRAIN PER CIVIL DRAWINGS

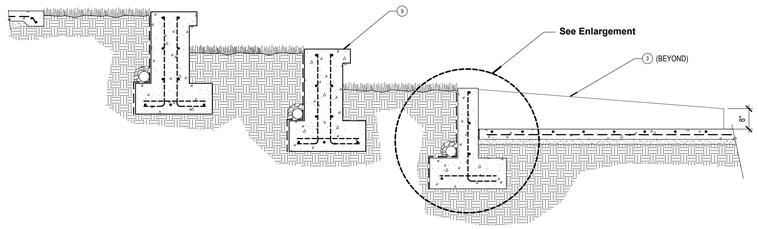
NOTES
A. SEE MASTER CONSTRUCTION LEGEND FOR COLORS AND FINISHES
B. SEE GRADING PLAN FOR GRADES AND TOP OF WALLS
C. SKATE DETERRENTS TO BE INSTALLED, SEE DETAIL L, SHEET L1.51 (Δ)



Enlargement View - Section Only
Scale: 3/4" = 1'-0"

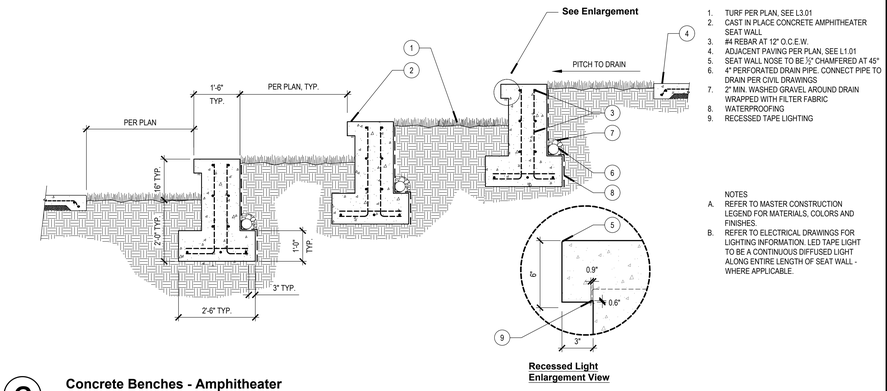


Plan View
Scale: 1/2" = 1'-0"



F Retaining Wall at Wheelchair Space at Amphitheater

Scale: 1/2" = 1'-0"



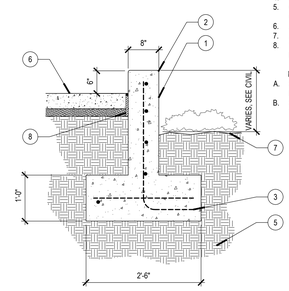
Recessed Light Enlargement View

1. TURF PER PLAN, SEE L3.01
2. CAST IN PLACE CONCRETE AMPHITHEATER SEAT WALL
3. #4 REBAR AT 12" O.C.E.W.
4. ADJACENT PAVING PER PLAN, SEE L1.01
5. SEAT WALL NOSE TO BE ½" CHAMFERED AT 45°
6. 4" PERFORATED DRAIN PIPE. CONNECT PIPE TO DRAIN PER CIVIL DRAWINGS
7. 2" MIN. WASHED GRAVEL AROUND DRAIN WRAPPED WITH FILTER FABRIC
8. WATERPROOFING
9. RECESSED TAPE LIGHTING

NOTES
A. REFER TO MASTER CONSTRUCTION LEGEND FOR MATERIALS, COLORS AND FINISHES.
B. REFER TO ELECTRICAL DRAWINGS FOR LIGHTING INFORMATION. LED TAPE LIGHT TO BE A CONTINUOUS DIFFUSED LIGHT ALONG ENTIRE LENGTH OF SEAT WALL - WHERE APPLICABLE.

G Concrete Benches - Amphitheater

Scale: 1/2"=1'-0"

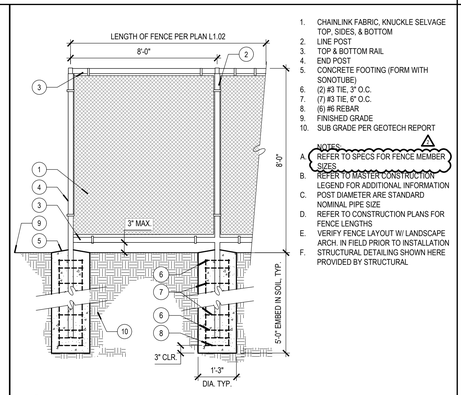


P Retaining Wall at Sloped Walk

Scale: 3/4"=1'-0"

1. POURED IN PLACE CONCRETE WALL
2. ½" RADIUS ALL CORNERS, TYP.
3. #4 REBAR AT 12" O.C.E.W.
4. NOT USED
5. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
6. ADJACENT PAVING PER PLAN
7. ADJACENT PLANTING AREA PER PLAN
8. VERTICAL EXPANSION JOINT, SEE DETAIL C/L1.51

NOTES:
A. SEE MASTER CONSTRUCTION LEGEND FOR COLOR AND FINISH
B. SEE GRADING PLAN FOR GRADES AND TOP OF WALLS



1. CHAINLINK FABRIC, KNUCKLE SELVAGE TOP, SIDES, & BOTTOM
2. LINE POST
3. TOP & BOTTOM RAIL
4. END POST
5. CONCRETE FOOTING (FORM WITH SONOTUBE)
6. (2) #3 TIE, 3" O.C.
7. (7) #3 TIE, 6" O.C.
8. (6) #6 REBAR
9. FINISHED GRADE
10. SUB GRADE PER GEOTECH REPORT

NOTES:
A. REFER TO SPECS FOR FENCE MEMBER SIZES
B. REFER TO MASTER CONSTRUCTION LEGEND FOR ADDITIONAL INFORMATION
C. POST DIAMETER ARE STANDARD NOMINAL PIPE SIZE
D. REFER TO CONSTRUCTION PLANS FOR FENCE LENGTHS
E. VERIFY FENCE LAYOUT W/ LANDSCAPE ARCH. IN FIELD PRIOR TO INSTALLATION
F. STRUCTURAL DETAILING SHOWN HERE PROVIDED BY STRUCTURAL

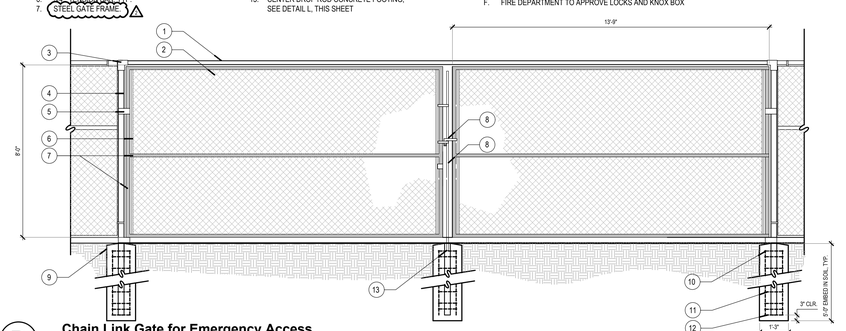
L Chain Link Fencing

Scale: 1/2"=1'-0"

1. STEEL TOP, MID, AND BOTTOM RAILS
2. CHAINLINK FABRIC, KNUCKLE SELVAGE ALL SIDES.
3. CLAMP, TYP. OF TWO (2)
4. DELETION (GATE POST, STEEL)
5. BUTT HINGE W/180 DEGREE SWING, TYP.
6. ¾" TENSION BAR, TYP.
7. STEEL GATE FRAME

8. CENTER DROP ROD ASSEMBLY
9. CONCRETE POST FOOTINGS, SEE DETAIL L, THIS SHEET
10. (2) #3 TIE, 3" O.C.
11. (7) #3 TIE, 6" O.C.
12. (6) #6 REBAR
13. CENTER DROP ROD CONCRETE FOOTING, SEE DETAIL L, THIS SHEET

NOTES:
A. REFER TO SPECS FOR FENCE MEMBER SIZES AND INFORMATION
B. REFER TO MASTER CONSTRUCTION LEGEND FOR ADDITIONAL INFORMATION
C. POST DIAMETER ARE STANDARD NOMINAL PIPE SIZE
D. REFER CONSTRUCTION PLANS FOR FENCE LENGTHS
E. VERIFY FENCE LAYOUT W/ LANDSCAPE ARCH. IN FIELD PRIOR TO INSTALLATION
F. FIRE DEPARTMENT TO APPROVE LOCKS AND KNOX BOX



D Chain Link Gate for Emergency Access

Scale: 3/8"=1'-0"

2/13/2020 3:47:43 PM

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

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ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT
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844 EAST GREEN STREET, SUITE 201
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5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
CONSTRUCTION DETAILS

ADDENDUM #2

FILE NO.: 36-C1 A# : 04-119722

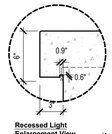
DATE: 06.17.2021 CLIENT PROJ NO:

SHEET:

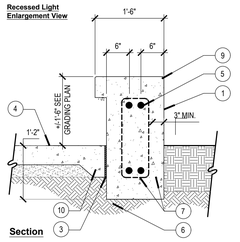
L1.52

PLEASE RECYCLE

IF THE LINE BROWN ABOVE IS
EXACTLY 1" LONG THEN THIS
SHEET IS ORIGINAL SHOP SIZE



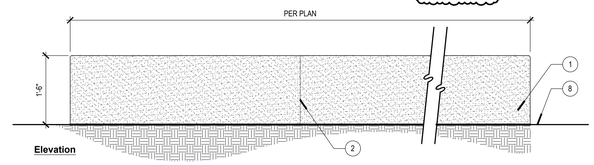
Recessed Light
Enlargement View



Section

1. POURED-IN-PLACE CONCRETE WALL. COLOR & FINISH PER MASTER CONSTRUCTION LEGEND. PITCH TOP TO DRAIN.
2. EXPANSION JOINT, ±5' O.C. TYPICAL. SPREAD EQUALLY ACROSS LENGTH OF WALL.
3. VERTICAL EXPANSION JOINT. SEE DETAIL C/L1.51
4. ADJACENT PAVING PER PLAN
5. 2 NO.4 REBAR TOP AND BOTTOM HORIZONTAL, CONTINUOUS
6. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
7. NO. 4 REBAR VERTICAL @ 12" O.C. WITH ALTERNATE BENDS IN FOOTING
8. FINISH SURFACE PER PLAN
9. 1/2" RADIUS, TYP.
10. THICKENED EDGE AT SEATWALL

NOTES:
A. CONTRACTOR TO PROVIDE FULL-SCALE MOCKUP
B. SKATE DETERRENTS TO BE INSTALLED, SEE DETAIL L, THIS SHEET



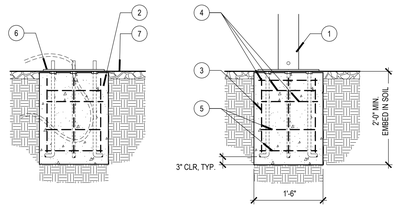
Elevation

E Concrete Benches - Entry Courtyard

Scale: 3/4"=1'-0"

1. LIGHT POLE PER ELECTRICAL PLAN
2. CONCRETE FOOTING
3. (6) #6 LONGITUDINAL ENFORCEMENT
4. #3 TIES @ 2" O.C.
5. #3 TIES @ 6" O.C.
6. LIGHT POLE BASE PLATE, SEAL WITH SILICONE PER MANUFACTURER'S RECOMMENDATION.
7. ADJACENT PLANTING AREA WITH MULCH LAYER

NOTES:
A. CONTRACTOR SHALL REFER TO STRUCTURAL ENGINEER'S PLANS FOR FOOTING DESIGN, STEEL REINFORCEMENT AND LIGHT POLE CONNECTIONS.
B. CONTRACTOR SHALL REFER TO ELECTRICAL ENGINEER'S PLANS FOR LIGHT POLE SPECIFICATIONS AND FOOTING CONNECTIONS.



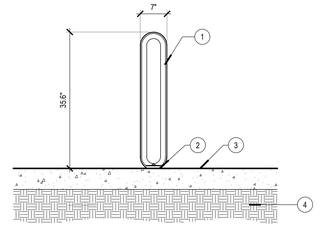
Section:
Base Plate
Installation

Section:
Installed

F Light Pole Base

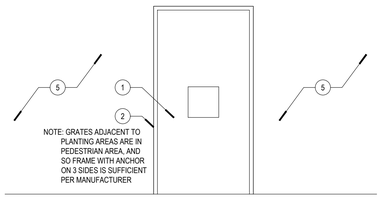
Scale: NTS

1. BICYCLE RACK - SEE MASTER CONSTRUCTION LEGEND FOR MORE INFORMATION.
2. SURFACE MOUNTED PER MANUFACTURER'S SPECIFICATIONS.
3. PAVING PER PLAN.
4. SUBGRADE COMPACTED PER GEOTECH REPORT.



B Bike Rack Mounting

Scale: 3/4"=1'-0"

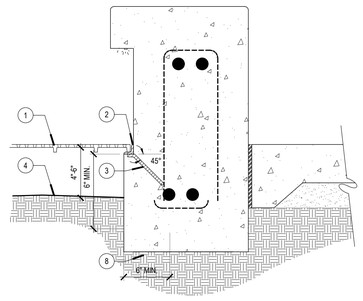


PA

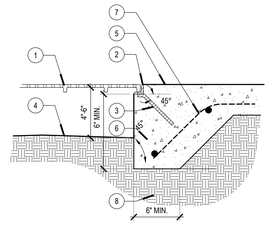
Plan of grate adjacent to PA
NTS

1. METAL TREE GRATE
2. ANGLE STOCK PERIMETER FRAME SIZED TO COORDINATE WITH GRATE THICKNESS, INSTALL PER MANUFACTURERS INSTRUCTIONS.
3. TYP. #3 REBAR EMBEDMENT ANCHOR 6" TYP. OVERALL LENGTH. INSTALL PER MANUFACTURER'S INSTRUCTIONS
4. FINISH GRADE AT TREE WELL
5. ADJACENT PAVING PER PLAN
6. THICKENED CONCRETE EDGE
7. REBAR AND SIZING PER CIVIL
8. COMPACTED SUBGRADE PER GEOTECH REPORT
9. CONCRETE BENCH, SEE E/L1.53

NOTES:
A. TREE GRATE MODEL AND FINISH PER MASTER CONSTRUCTION LEGEND.
B.



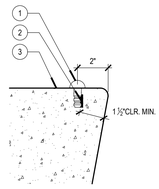
Section at grate adjacent to bench



Standard section

H Tree Grate

Scale: 1 1/2" = 1'-0"



1. HEMI GRINDERMINDER, INSTALL PER MANUFACTURER'S INSTRUCTIONS
2. PLACE SHIM LOCK ON SIDE
3. CONCRETE WALL OR BENCH PER PLAN

PROCEDURE:
A. DRILLING FREE-HAND, DRILL A ½" DIAMETER HOLE INTO CONCRETE WALL OR BENCH APPROXIMATELY 1 ½" DEEP. NOTE: THE CONCRETE DRILL SHOULD CREATE A HOLE THAT IS SLIGHTLY OVER ½"DIAMETER. THIS WILL ALLOW ROOM FOR THE LOCKING SHIM AND EPOXY
B. DRILL HOLE APPROXIMATELY 1-1/2" DEEP. THE ENTIRE STEM OF THE GRINDERMINDER SHOULD BE INSERTED SO THAT THE FLAT BOTTOM OF THE HEMISPHERE GRINDERMINDER IS FLUSH WITH THE SURFACE, SLIGHTLY SET IN FROM THE EDGE OF THE SEAT WALL
C. CLEAR ALL DEBRIS FROM THE DRILLED HOLE
D. PLACE ONE PIECE OF SHIM STOCK IN THE DRILLED HOLE ON THE SIDE OF THE HOLE
E. FILL THE HOLE APPROXIMATELY ONE-THIRD FULL WITH EPOXY
F. INSERT THE GRINDERMINDER INTO THE HOLE AND DRIVE IT INTO THE HOLE USING A RUBBER MALLET
G. CAREFULLY WIPE ANY EXCESS EPOXY FROM THE STONE AND GRINDERMINDER IMMEDIATELY
H. REPEAT THIS PROCESS FOR EACH GRINDERMINDER TO BE INSTALLED. GRINDERMINDERS SHOULD BE INSTALLED AT ROUGHLY 36" INTERVALS, BE SURE NOT TO INSTALL GRINDERMINDERS DIRECTLY INTO A MORTAR JOINT, AS THEY WILL BE MUCH EASIER FOR A VANDAL TO REMOVE.

L Hemisphere (Hemi) GrinderMinder Skate Deterrent

SA-1
W-2

Scale: 3" = 1'-0"

AGENCY APPROVAL:

REVIEWING AGENCIES
STAMP HERE

Chaffey College

HMC Architects

5009006-000

3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

NOT FOR CONSTRUCTION

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT

EPTDESIGN
844 EAST GREEN STREET, SUITE 201
PASADENA, CA 91101
626.795.2008
EPTDESIGN.COM

FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

CONSTRUCTION DETAILS

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

L1.53

2/13/2023, 3:47:43 PM

PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG AT THIS ORIGINAL DRAWING SIZE

WATER EFFICIENT LANDSCAPE WORKSHEET

Reference Evapotranspiration (ETo) 54.6 Project ETAF Project ETAF 0.45

Hydro-zone #	Planting Descriptions[a]	Plant Factor (PF)	Irrigation Method[b]	Irrigation Efficiency (IE)[c]	ETAF (PF/IE)	Landscape Area (sq. ft.)	Landscape Percentage	ETAF x Area	Estimated Total Water Use (ETWU)[d]
	Regular Landscape Areas								
						-	0%	-	-
						-	0%	-	-
						-	0%	-	-
						-	0%	-	-
						-	0%	-	-
					Subtotals	-	0%	-	-
	Special Landscape Areas								
1	Recycled water				1	58,285	100%	58,285.00	1,973,063.82
					1		0%	-	-
					1		0%	-	-
					1			-	-
					1			-	-
				Subtotals		58,285	100%	58,285.00	1,973,063.82
				Total Landscape Area		**58,285**	**100%**	**ETWU Total**	1,973,063.82
								ETWU (in acre-feet)	6.06
							Maximum Allowed Water Allowance (MAWA)[e]		1,973,063.82
								MAWA (in acre-feet)	6.055102475

[a] *Hydrozone/Planting Description*
E.g.
1) Front Lawn
2) Low water use plantings
3) Medium water use planting

[b] *Irrigation Method*
Overhead spray or drip

[c] *Irrigation Efficiency*
.75 for spray head
.81 for drip & Bubbler

[d] *ETWU (Annual Gallons Required) =* ETo x 0.62 x ETAF x Area
where 0.62 is conversion factor that converts acre-inches per acre per year to per square foot per year.

[e] *MAWA (Annual Gallons Allowed)* = *(ETo) (0.62)((ETAF x LA) + ((1-ETAF) x SLA))*
where 0.62 is conversion factor that converts acre-inches per acre per year to gallon per square foot per year, LA is the total landscape area in square feet, SLA is the total special landscape area in square feet, and ETAF is 0.55 for residential areas and 0.45 for non-residential areas

ETAF Calculations

Regular Landscape Areas

Total ETAF x Area	-
Total Area	0
Average ETAF	**0**

All Landscape Areas

Total ETAF x Area	58,285.00
Total Area	58,285
Sitewide ETAF	**1.00**

Average ETAF for Regular Landscape Areas must be 0.55 or below for residential areas, and 0.45 or below for non-residential area.

NOTE: ALL LANDSCAPE IS DESIGNATED "SPECIAL LANDSCAPE AREA" BECAUSE ALL AREAS TO BE IRRIGATED WITH RECYCLED WATER.

GENERAL IRRIGATION NOTES

1. The irrigation contractor shall be responsible for familiarizing themselves with all differences in grade, location of seatwalls, location of retaining walls, etc. The contractor shall be responsible for coordinating all irrigation work with the general contractor, electrical contractor, and all other subcontractors for the location and the installation of irrigation related sleeves through walls, structures, under roadways, paving, etc.
2. The irrigation design presented in these documents is intended to be diagrammatic. All irrigation equipment, piping and valve locations, etc. shown within paved areas are for design clarification and shall only be installed in planting areas. Irrigation contractor shall install all remote control valves, quick couplers, and gate valves, in shrub planting areas or as approved by owner's representative & the landscape irrigation designer. Avoid any conflicts between the sprinkler system, planting and architectural features.
3. The irrigation system design is based upon the minimum operating pressure and the maximum flow demand shown on the irrigation drawings at each point of connection. The irrigation contractor shall verify water pressure prior to construction. Any difference between the water pressure indicated on the drawings and the actual pressure reading at the irrigation point of connection shall be immediately reported in writing to the owner's authorized representative. If the pressure differences are not immediately reported prior to beginning construction, the irrigation contractor shall assume full responsibility for all revisions to the irrigation system deemed necessary by the owner's representative and all costs associated with those revisions.
4. When it is apparent to the landscape contractor in the field that obstructions, grade differences, or differences in the calculated area dimensions exist that may have not been considered in the design of the system, the irrigation contractor shall not willfully install the irrigation system as indicated on the construction drawings. The owner's authorized representative shall be notified in writing of any such obstructions or differences prior to beginning any irrigation installation. If notification is not received prior to beginning installation, the irrigation contractor shall assume full responsibility for all revisions to the irrigation system as deemed necessary by owner's representative and all costs associated with those revisions.
5. The irrigation contractor shall be responsible for installing all control wire sleeving of sufficient size, under all paved areas in addition to the control wire sleeving shown on the drawings.
6. All piping and equipment shall be installed per the irrigation details. Teflon tape or Teflon pipe dope shall be applied to all male PVC pipe threads on all irrigation valve assemblies.
7. All pop-up style irrigation heads located in in shrub or groundcover areas shall be installed so the top of the irrigation head is 1" above finish grade.
8. All pop-up style irrigation heads to be located in turf areas shall initially be installed so the top of the irrigation heads are flush with the adjacent sidewalk or curb. Within 10 days of being notified by the owner's representative, the irrigation contractor shall be responsible for adjusting all turf irrigation heads so the top of the irrigation head is 1/2" above finish grade.
9. The irrigation contractor shall be responsible for flushing and adjusting all irrigation heads for optimum performance and to prevent over spray onto areas not intended for irrigation. This shall include selecting the proper the arc pattern, adjusting the spray radius of the irrigation head with PRS screens and/or also throttling the flow control at each valve to obtain the optimum operating pressure for each system.
10. The irrigation contractor shall be responsible for adjusting the pressure regulator on each electric control valve so the irrigation head farthest and highest in elevation from its associated control valve functions within the operating pressure shown on the irrigation legend (not to exceed 5 PSI above the indicated operating pressure).
11. When installing Rain Bird 1800 series nozzles that require arc patterns other than the standard arc patterns (e.g., 360°, 180°, and 90°), the contractor shall use the appropriate fixed arc pattern (e.g. 120°, 240°, 270°). The contractor shall use Rain Bird variable arc nozzles (VAN) when installing irrigation heads using Rain Bird 1800 series nozzles only when required pattern is not one of the fixed arc patterns. Select the radius of VAN nozzles to match site conditions. For example: use 8-VAN when an 8 foot radius is required or a 12-VAN where a 12 foot radius is required.
12. The irrigation contractor shall be responsible for making field adjustments to the irrigation system by installing a quarter circle or half circle sprinkler head on each side of any vertical element (props, street lights, trees, etc.) which prevents proper coverage by interfering with the spray pattern of the irrigation head. All adjustments shall be made at no additional costs to the owner.
13. Drainage of irrigation water through spray head will not be allowed. Rain Bird SAM feature shall be used to prevent spray head drainage. During construction, the contractor shall change spray bodies from Rain Bird 1800-PRS to 1800-SAM-PRS for spray heads showing signs of draining after the irrigation system has operated from an ON to OFF position. Installation of Rain Bird SAM feature shall be included in the Bid Price of the irrigation system.
14. The irrigation contractor shall be responsible for making the final connection between the power source and the automatic controller. 120 volt electrical power source shall be provided by others at the automatic controller location.
15. Adhesives, sealants and caulks shall meet local or regional air pollution control or south coast AQMD rule 1168 VOC and statewide VOC standards.
16. Contractor shall verify exterior mounted rain sensor location and provide wiring between rain sensor and controller.
17. Heat stamp all boxes with clock number, and valve number, typical.
    Ball Valves "BV##"
    Quick Couplers "QC##"
    Mastr Valves "MV##"
    Isolation Valves "IV##"
18. Lightly stamp concrete with butt end of 1" PVC pipe wherever a sleeve is installed under the concrete (both sides), typical.
19. Specify a tag with a valve number on all valves installed underground.
20. Add Ball Valves in front of cylinoid valves for ease of replacements in the future, typ.

OBSERVATION SCHEDULING

The landscape contractor shall schedule an irrigation site observation by the irrigation designer, and/or the owner's representative, which shall not occur without at least 48 hours prior notification. The following items shall be reviewed:

1. Pre-job/kick-off meeting with contractor, general contractor, and irrigation designer.
2. Mainline, backflow preventer, master valves, flow sensors, booster pump installation and operation, installation review prior to backfilling trenches, irrigation mainline pressure test, etc.
3. Finalizing the location for the controller assemblies - landscape contractor shall coordinate with the irrigation designer to verify connection of flow sensors and associated equipment to each controller assembly and for certification/warranty of equipment.
4. Irrigation coverage test - a dynamic pressure test shall be performed by the landscape contractor and shall be observed by the owner (or the owner's representative) and the irrigation designer for each valve during the irrigation coverage test.

IRRIGATION CONSTRUCTION NOTES

1 POC NOTE

The landscape contractor shall purchase and install one 2" reclaimed water meter located per the civil engineer's sewer & water plan and as shown on the irrigation plan. Verify that the static pressure is 120 PSI prior to construction. Contractor shall furnish and install mainline to the flanged gate valves, backflow preventer, quick couplers, master valve, and flow sensor per the irrigation legend and details. (Refer to the irrigation plans for sizing). Refer to irrigation legend and irrigation construction notes for model numbers. Install the flow sensor per the manufacturer's recommendations and details. Contractor shall furnish all materials and labor to execute and install the irrigation system per the irrigation plans.

Install the gate valves, backflow preventer, master valves, flow sensors, and quick couplers within the shrub planting areas only.

The flow sensor wire shall be manufactured by "Rain Master", model #EV-CAB-SEN. No field splices allowed between flow sensor and controller. All flow sensor wires shall be installed within a gray 1-1/2" DIA., SCH. 40 PVC conduit. Each conduit shall have a separate flow sensor cable installed within it based on the corresponding controller assembly. Imperial Technical Services shall make the final connections from the flow sensor to the controller assemblies.

Mainline shown in hardscape areas is diagrammatic. Mainlines are intended to be installed within the shrub areas only. Any mainline, lateral, or control wires that run under hardscape areas shall be installed in SCH. 40 PVC sleeves which shall be sized a minimum of twice the diameter of the actual pipe diameter. Refer to irrigation details for installation and depths of sleeving.

CONTROLLER INFORMATION

2 CONTROLLER NOTE

MANUFACTURER: RainBird
TYPE: Modular Controller
ASSEMBLED BY: RainBird

CONTROLLER IDENTIFICATION	CONTROLLER PART NUMBER
A	ESP-LXME-FS-MP

INTERNET REQUIRED: YES, WIFI CONNECTION
FLOW SENSOR CABLE: YES
Install flow sensor cable in a 1 1/2" U.L. PVC SCH. 40 gray conduit.

The 120 volt power supply connection to the irrigation controller assembly shall be the responsibility of the irrigation contractor. Refer to electrical plans for additional information. Final location of the irrigation controller assembly shall be approved by the owner's authorized representative prior to installation. All sprinkler heads shall be field adjusted to prevent over spray onto the irrigation controller assembly enclosure.

The system is designed for the operation of one valve at a time per controller. The system has been designed for one valve opening and one valve closing.

The controller shall be located as shown on the drawings or as directed by the owner's authorized representative.

Contractor to determine best way to provide internet connectivity for controller in prioritized order per site conditions. Ethernet cable, WIFI, cellular. Components in controller to provide internet connectivity will vary.

PRESSURE CALCULATIONS FOR DOMESTIC IRRIGATION

Project Name and/or Tract#: 1
Date and Source of Information: 12/08/20
Name of Contact Person and Phone Number:
P.O.C. Water Meter #: 1
Water Meter Size and Type: 2" Reclaimed Water Meter
Hydraulic Grade Level: FT
Water Meter Elevation: 655 FT
Highest Head Elevation on the System: 660 FT
Basis for Calculations: Highest GPM Demand

Remote Control Valve#: A5

Size of Remote Control Valve: 1.5"
Demand at Remote Control Valve: 34 GPM

QUANTITY	SIZE	DESCRIPTION	FLOW (GPM)	LOSS (PSI)
1	2"	Water Meter	34	0
1	2"	Backflow RP	34	10
		Pressure Regulator		
2	2"	Gate Valve(s)	34	0
		Gate Valve(s)		
1	2"	Master Valve	34	0
1	2"	Flow Sensor	34	0
99 LF	2"	Mainline	34	1
-	-	Mainline	-	-
		Mainline		
		Mainline		
1	2"	Remote Control Valve	34	3
		Lateral Line Losses(10%)		2
		Other Losses (10%)		2
		Elevation Loss or Gain GAIN		1
		Total		19

PRESSURE (PSI)

Pressure Required to Operate Irrigation Head	50
Sub-Total Pressure Required for Irrigation System	69
Total Pressure Required for Irrigation System (Sub-Total Pressure + 25%)	86.25
Static Pressure Available	120
Residual Pressure (Subtract Total Pressure from Static Pressure)	33.75

IRRIGATION LEGEND

SYMBOL	RAD.	MANF.	MODEL NO. WITH NOZZLE SIZE & TYPE	DESCRIPTION	PSI	FLOW RATE IN GPM F	H	Q	A (VAR)	DETAIL
○ ○ F H Q A	8-14'	RainBird	R-VAN 14 adjustable on RD-06-S-P45-NP	Pop-Up Turf Rotary Nozzle	40	-	.42	.23	-	J/L2.51
●	-	RainBird	RWS-B-C-1402 (.50 GPM) w/ RWS-GRATE-P	Bubbler in Sleeve with Purple Grate Cap	30	.50	-	-	-	K/L2.51
○	-	RainBird	1402 on RD04-S-P30-NP w/ PA-80	Flood Bubbler on 4" pop-up Spray Head	30	.50	-	-	-	J/L2.51
■	-	RainBird	1401 on RD04-S-P30-NP w/ PA-80	Flood Bubbler on 4" pop-up Spray Head	30	.25	-	-	-	J/L2.51
◓	-	RainBird	5-CST-B on RD06-S-P30-NP w/ PA-80	Stream Bubbler on 6" pop-up Spray Head	30	.38	-	-	-	J/L2.51
2 2 1	39'	RainBird	5006-+-SAM-R-NP-SS with 3.0 nozzle	6" Pop-Up Rotor w/ Stainless Steel Riser	50	5.8				J/L2.51
2 2 1	39'	RainBird	5006-+-SAM-R-NP-SS with 3.0 nozzle	6" Pop-Up Rotor w/ Stainless Steel Riser	50	-	2.8	-	-	J/L2.51
2 2 1	39'	RainBird	5006-+-SAM-R-NP-SS with 3.0 nozzle	6" Pop-Up Rotor w/ Stainless Steel Riser	50	-	-	1.2	-	J/L2.51
		RainBird	Irrigation Dripline (Shrub) - XFS-P-06-18	Space lateral rows at 18". Dripper spacing at 18". Install 3" min - 6" max below grade per specifications. Application rate: 0.43 in/hr. Time to apply 1/4": 36 minutes.	30	0.6 GPH Flow Rate				M,N/L2.51
		RainBird	Irrigation Dripline (Turf) - XFS-P-06-12	Space lateral rows at 12". Dripper spacing at 12". Install on top of soil per manufacturer's specifications. Application rate: 0.64 in/hr. Time to apply 1/4": 24 minutes.	30	0.6 GPH Flow Rate				M,N/L2.51
		Netafim	TLSOV - Manual Flush Valve	Install per manufacturers specifications.						L/L2.51
		RainBird	Drip Connector							-
		RainBird	OPERIND	Install per manufacturers specifications.						-
RW	-		2" Reclaimed Water Meter Per Civil	See the civil engineers plans for additional information						B/L2.52
		RainBird	IMB-S3 - Basket Strainer	For reclaimed water service - size per plan. Install in purple Carson Valve Box						-
		Nibco	T-111 Gate Valve	For mainline sizes 3" and larger, use Nibco F-619-SON, epoxy coated. Assemble with stainless steel hardware. Install in a 10" round value box.						I/L2.51
MV		RainBird	Superior 2" Master Valve, normally closed	Master Valve to be installed in rectangle valve box adjacent to flow sensor.						A/L2.51
FS		RainBird	FS-200-P Flow Sensor	Size per plan. Install per detail. See irrigation construction notes for additional information and model numbers.						B/L2.51
		RainBird	33-DNP - 3/4" Quick Coupler Valve	Quick coupler valve with purple locking rubber cover. Install in purple round Carson Valve Box per detail.						H/L2.51
		RainBird	EFB-CP-PRS-D - Remote Control Valve	Remote control valve, angle flow pattern, purple colored flow control handle, size per plan. Install in purple rectangle Carson Valve Box.						F/L2.51
		RainBird	XCZ-PRB-100-COM - up to 25 GPM XCZ-PRB-150-COM - up to 35 GPM	Remote control valve kit with pressure regulating basket filter. Install in purple rectangle Carson Valve Box per detail.						G/L2.51
A		RainBird	ESP-LXME-FS-MP - Controller	Irrigation controller assembly with flow sensing and ET capability located per irrigation plans. See irrigation construction notes for more information.						D/L2.51
			Existing Reclaimed Water Mainline	Protect in place.						-
			Reclaimed Water Mainline	Irrigation Mainline - Use purple pipe for all irrigation piping. PVC SCH. 40 IPS for mainline sizes 1" to 2" PVC Class 315 IPS for mainline sizes 2" and greater. Sleeve mainline per notes and details.						C,E/L2.51
			Lateral Line	Lateral Pipe - Use purple pipe for all irrigation piping. Minimum pipe size shall be 3/4" - size laterals per plan. PVC SCH. 40 IPS for sizes 3/4" to 2 1/2" PVC Class 315 IPS for sizes 3" and larger						C,E/L2.51
			PVC Sleeves	PVC SCH. 40 IPS purple pipe - sleeves shall be installed for any mainline, lateral, or wires crossing under hardscape per irrigation construction notes. Size to be two times the pipe diameter or wire bundle.						E/L2.51

IRRIGATION VALVE CALLOUT:

Station No.
GPM
Plant Type
Valve Size

LATERAL LINE SIZING CHART

3/4"	
1"	
1 1/4"	
1 1/2"	
2"	
2 1/2"	
3"	

NOTE: THE LATERAL SIZE BETWEEN TWO IDENTICAL TICK MARKS SHALL BE SIZED THE SAME. MINIMUM PIPE SIZE IS 3/4".

PLANT MATERIAL ABBREVIATIONS:

Plant Type:
TF Turf
SB Shrub / Ground Cover
TR Trees
PT Pots

Hydrozone:
H High
M Medium
L Low

DOMESTIC WATER POINT OF CONNECTION EQUIPMENT SIZES:

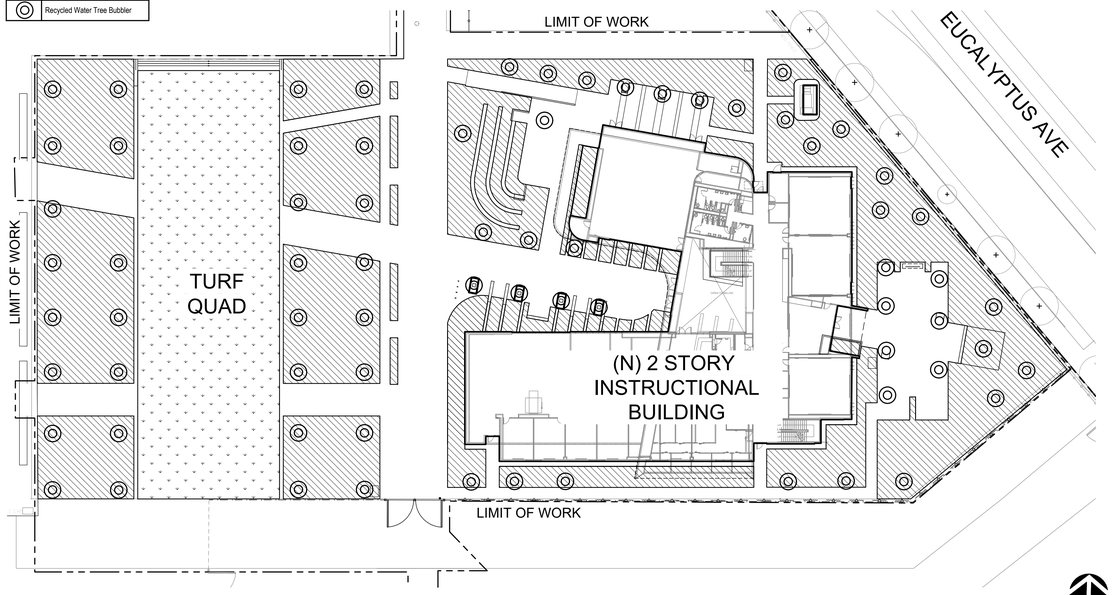
P.O.C. #			
WM	BF	MV	FS
XX	XX	XX	XX
CONTROLLER X			

DOMESTIC WATER METER LOCATION SEE IRRIGATION CONSTRUCTION NOTE # 1 ON SHEET 12.XX

POC = WATER METER
WM = WATER METER
BF = BACK FLOW
MV = MASTER VALVE
FS = FLOW SENSOR

HYDROZONE LEGEND

	Recycled Water Drip Irrigation
- - -	Recycled Water Spray Irrigation
◎	Recycled Water Tree Bubbler



A Hydrozone Plan
Scale: 1/32" = 1'-0"

HYDROZONE PLAN & IRRIGATION SCHEDULE

PLEASE RECYCLE

2/13/2020 3:47:43 PM

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

Chaffey College

HMC Architects
5009006-000
3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 0979 / www.hmcarchitects.com

NOT FOR CONSTRUCTION

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT

EPTDESIGN
844 EAST GREEN STREET, SUITE 201
PASADENA, CA 91101
626.795.2008
EPTDESIGN.COM

FACILITY:
CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:
CHINO INSTRUCTIONAL BUILDING

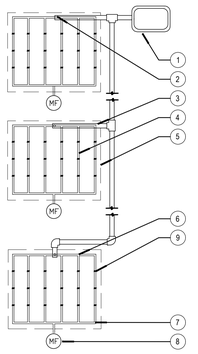
SHEET NAME:
IRRIGATION SCHEDULE, NOTES & HYDROZONE PLAN

ADDENDUM #2

FILE NO.: 36-C1 A# : 04-119722
DATE: 06.17.2021 CLIENT PROJ NO:
SHEET:

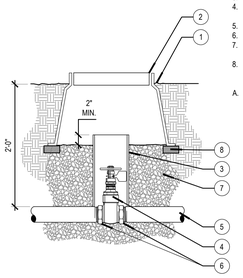
L2.00

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON ALL SHEETS ORIGINAL PAPER SIZE



1. REMOTE CONTROL VALVE WITH DISC FILTER AND PRESSURE REGULATING VALVE
2. DRIP TUBING START CONNECTION MALE ADAPTER
3. PVC OR POLY SUPPLY HEADER
4. DRIP TUBING. SEE LEGEND FOR EMITTER AND LATERAL LINE SPACING
5. ISLAND PERIMETER
6. DRIP TUBING TEE
7. DRIP TUBING ELL
8. MANUAL FLUSH VALVE PLUMBED TO DRIP TUBING
9. DRIPLINE STAPLES @ 10' O.C.

M Dripline Island Layout
Scale: NTS

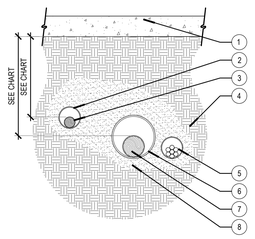


1. FINISH GRADE
   - 1/2" FROM TOP OF BOX LID IN TURF
   - 1 1/2" FROM TOP OF BOX LID IN SHRUB/GC
2. ROUND, PLASTIC VALVE BOX WITH LOCKING COVER SHALL BE BRANDED "GV" - REFER TO IRRIGATION LEGEND
3. 6" Ø PVC PIPE EXTENSION - LENGTH AS REQUIRED
4. GATE VALVE - REFER TO IRRIGATION LEGEND FOR SPECS.
5. PVC MAINLINE - REFER TO IRRIGATION LEGEND
6. PVC MALE ADAPTER - TWO (2) REQUIRED
7. PEA GRAVEL - TWO (2) CUBIC FEET AT BASE OF VALVE
8. BRICK (1 OF 4)

NOTE:
A. ALL THREADS SHALL BE WRAPPED WITH TEFLON TAPE

I Gate Valve
Scale: 1"=1'-0"

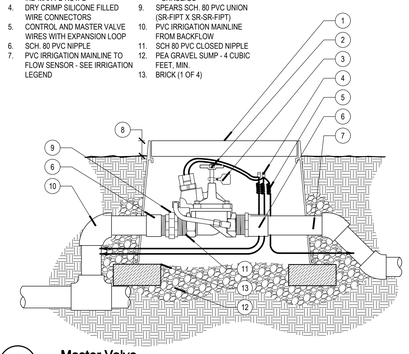
LINE TYPE	LOCATION	DEPTH
PRESSURIZED MAINLINE	IN LANDSCAPE	24"
	UNDER VEH. PAVING	36"
LATERAL LINES	IN LANDSCAPE	18"
	UNDER VEH. PAVING	30"



1. VEHICULAR or PEDESTRIAN PAVING - REFER TO CONSTRUCTION LAYOUT PLANS FOR SPECIFIC CONDITION
2. LATERAL LINE SLEEVING SHALL BE SCH. 40 PVC - SLEEVE DIA. SHALL BE 2 x LATERAL DIA.
3. LATERAL LINE - REFER TO SPECIFICATIONS
4. BACKFILL - 90% RELATIVE COMPACTION, MINIMUM - REFER TO GEOTECHNICAL REPORT
5. CONTROL WIRE BUNDLE SLEEVING SHALL BE SCH. 40 PVC PIPE
6. MAINLINE SLEEVING SHALL BE SCH. 40 PVC PIPE - SLEEVE DIA. SHALL BE 2 x MAINLINE DIA.
7. MAINLINE - REFER TO SPECIFICATIONS
8. SAND BACKFILL - 6" BASE & 6" OF COVER, MIN.

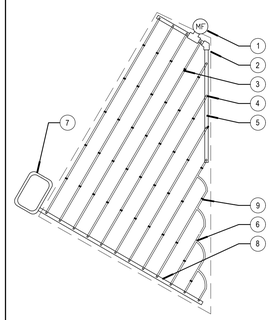
NOTES:
A. ALL IRRIGATION WIRES, LATERALS AND MAINLINE UNDER HARDSCAPE SHALL BE PLACED IN SLEEVES
B. IRRIGATION CONTRACTOR SHALL COORDINATE ALL SLEEVING LOCATIONS & SIZES WITH HARDSCAPE CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION
C. ALL SLEEVES SHALL EXTEND A MINIMUM OF 12" BEYOND THE EDGE OF THE HARDSCAPE SURFACE

E Irrigation Sleeving
Scale: 1"=1'-0"



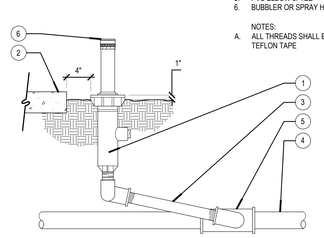
1. PLASTIC VALVE BOX
2. MASTER VALVE PER LEGEND
3. CHRISTY'S TAG #ID-MAX-P2-RC1P2
4. DRY CRIMP SILICONE FILLED WIRE CONNECTORS
5. CONTROL AND MASTER VALVE WIRES WITH EXPANSION LOOP
6. SCH. 80 PVC NIPPLE
7. PVC IRRIGATION MAINLINE TO FLOW SENSOR - SEE IRRIGATION LEGEND
8. FINISH GRADE
   - ¾" BELOW BOX LID IN TURF
   - 1 ½" BELOW BOX LID IN SHRUB/GC
9. SPEARS SCH. 80 PVC UNION (SR-FIPT X SR-SR-FIPT)
10. PVC IRRIGATION MAINLINE FROM BACKFLOW
11. SCH 80 PVC CLOSED NIPPLE
12. PEA GRAVEL SUMP - 4 CUBIC FEET, MIN.
13. BRICK (1 OF 4)

A Master Valve
Scale: 3"=1'-0"



1. MANUAL FLUSH VALVE PLUMBED TO PVC OR POLY
2. AREA PERIMETER
3. DRIP TUBING. SEE LEGEND FOR EMITTER AND LATERAL LINE SPACING
4. DRIP TUBING START CONNECTION MALE ADAPTER
5. PVC OR POLY EXHAUST HEADER
6. DRIP TUBING TEE
7. REMOTE CONTROL VALVE WITH DISC FILTER AND PRESSURE REGULATING VALVE
8. PVC OR POLY SUPPLY HEADER
9. DRIPLINE STAPLES @ 10' O.C.

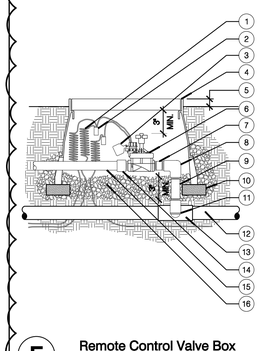
N Dripline Layout - Irregular Areas
Scale: NTS



1. RAINBIRD SPRAY BODY
2. PAVING EDGE, HEADER OR WALL
3. RAIN BIRD SA-SERIES SWING JOINT 12" MIN. FOR 6" POPUPS
4. PVC LATERAL LINE
5. PVC ELBOW or TEE
6. BUBBLER OR SPRAY HEAD PER PLAN

NOTES:
A. ALL THREADS SHALL BE WRAPPED WITH TEFLON TAPE

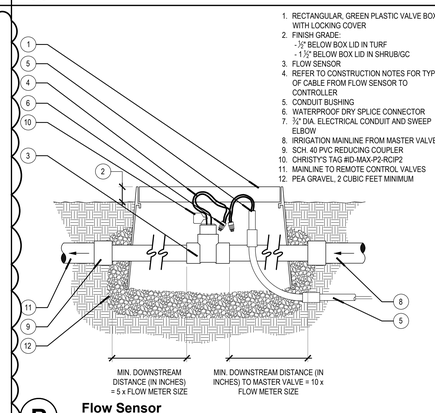
J Popup Stream Bubbler/Spray
Scale: 1 1/2"=1'-0"



1. 30" LENGTH OF COILED WIRE
2. WATER PROOF CONNECTOR - REFER TO IRRIGATION SPECIFICATIONS
3. CHRISTYS TAG #ID-MAX-PS-RC1P2
4. RECTANGULAR, PLASTIC VALVE BOX WITH LOCKING COVER - LID SHALL BE HEAT BRANDED WITH LETTERS "RCV" & STATION NUMBER - REFER TO IRRIGATION SPECIFICATIONS
5. FINISH GRADE:
   - 1/2" FROM TOP OF BOX LID IN SHRUB/GC
   - 1 ½" FROM TOP OF BOX LID IN SHRUB/GC
6. REMOTE CONTROL VALVE - REFER TO IRRIGATION LEGEND
7. SCH. 80 PVC NIPPLE (CLOSE)
8. SCH. 40 PVC ELL
9. SCH. 80 PVC NIPPLE (LENGTH AS REQUIRED)
10. BRICK (1 OF 4)
11. SCH. 80 PVC NIPPLE (2" LENGTH, HIDDEN) AND SCH. 40 PVC ELL
12. PVC MAINLINE PIPE
13. SCH. 40 PVC TEE OR ELL
14. SCH. 40 PVC MALE ADAPTER
15. PVC LATERAL PIPE
16. (3) CUBIC FEET, MIN. OF ¾" MINUS, WASHED GRAVEL

NOTE:
A. ALL THREADS SHALL BE WRAPPED WITH TEFLON TAPE

F Remote Control Valve Box
Scale: 1 1/2"-1'-0"



1. RECTANGULAR, GREEN PLASTIC VALVE BOX WITH LOCKING COVER
2. FINISH GRADE:
   - ½" BELOW BOX LID IN TURF
   - 1 ½" BELOW BOX LID IN SHRUB/GC
3. FLOW SENSOR
4. REFER TO CONSTRUCTION NOTES FOR TYPE OF CABLE FROM FLOW SENSOR TO CONTROLLER
5. CONDUIT BUSHING
6. WATERPROOF DRY SPLICE CONNECTOR
7. ¾" DIA. ELECTRICAL CONDUIT AND SWEEP ELBOW
8. IRRIGATION MAINLINE FROM MASTER VALVE
9. SCH. 40 PVC REDUCING COUPLER
10. CHRISTY'S TAG #ID-MAX-P2-RC1P2
11. MAINLINE TO REMOTE CONTROL VALVES
12. PEA GRAVEL, 2 CUBIC FEET MINIMUM

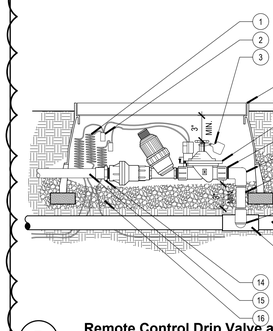
B Flow Sensor
Scale: 3"=1'-0"

1 4-INCH GRATE
2 ROOT WATERING SYSTEM: RAIN BIRD RWS-BCG (INCLUDES BUBBLER, CHECK VALVE AND GRATE)
3 BUBBLER
4 FINISH GRADE
5 CHECK VALVE
6 OPTIONAL PEA GRAVEL FOR SANDY SOILS
7 1/2-INCH PVC SCH 80 NIPPLE
8 1/2-INCH 90-DEGREE ELBOW
9 SWING PIPE, 12-INCH SWING ASSEMBLY
10 1/2-INCH MALE NPT INLET
11 PVC SCH 40 TEE OR EL
12 LATERAL PIPE
13 4-INCH BASKET WEAVE CANISTER

NOTE:
1. EQ. SPACE TYP. BETWEEN TRUNK AND CANOPY EDGE

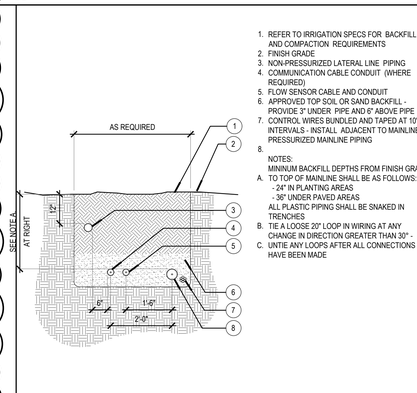
K Root Watering System
NTS

NOTE:
A. ALL THREADS SHALL BE WRAPPED WITH TEFLON TAPE



1. 30" LENGTH OF COILED WIRE
2. WATER PROOF CONNECTOR - REFER TO IRRIGATION SPECIFICATIONS
3. ID TAG - REFER TO IRRIGATION SPECIFICATIONS
4. RECTANGULAR, GREEN PLASTIC VALVE BOX WITH LOCKING COVER - LID SHALL BE HEAT BRANDED WITH LETTERS "RCV" & STATION NUMBER - REFER TO IRRIGATION SPECIFICATIONS
5. FINISH GRADE:
   - ½" FROM TOP OF BOX LID IN TURF
   - 1 ½" FROM TOP OF BOX LID IN SHRUB/GC
6. REMOTE CONTROL VALVE WITH FILTER AND PRV - REFER TO IRRIGATION LEGEND
7. SCH. 80 PVC NIPPLE (CLOSE)
8. SCH. 40 PVC ELL
9. SCH. 80 PVC NIPPLE (LENGTH AS REQUIRED)
10. BRICK (1 OF 4)
11. SCH. 80 PVC NIPPLE (2" LENGTH, HIDDEN) AND SCH. 40 PVC ELL
12. PVC MAINLINE PIPE
13. SCH. 40 PVC TEE OR ELL
14. SCH. 40 PVC MALE ADAPTER
15. PVC LATERAL PIPE
16. (3) CUBIC FEET, MIN. OF ¾" MINUS, WASHED GRAVEL

G Remote Control Drip Valve and Filter
Scale: 1 1/2"-1'-0"

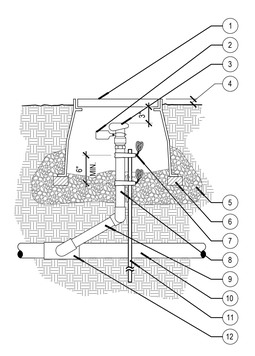


1. REFER TO IRRIGATION SPECS FOR BACKFILL AND COMPACTION REQUIREMENTS
2. FINISH GRADE
3. NON-PRESSURIZED LATERAL LINE PIPING
4. COMMUNICATION CABLE CONDUIT (WHERE REQUIRED)
5. FLOW SENSOR CABLE AND CONDUIT
6. APPROVED TOP SOIL OR SAND BACKFILL - PROVIDE 2" UNDER PIPE AND 6" ABOVE PIPE
7. CONTROL WIRES BUNDLED AND TAPED AT 10'-0" INTERVALS - INSTALL ADJACENT TO MAINLINE PRESSURIZED MAINLINE PIPING
8. NOTES:
   MINIMUM BACKFILL DEPTHS FROM FINISH GRADE
   A. TO TOP OF MAINLINE SHALL BE AS FOLLOWS:
      - 24" IN PLANTING AREAS
      - 36" UNDER PAVED AREAS
      ALL PLASTIC PIPING SHALL BE SNAKED IN TRENCHES
   B. TIE A LOOSE 20" LOOP IN WIRING AT ANY CHANGE IN DIRECTION GREATER THAN 30°
   C. UNTIE ANY LOOPS AFTER ALL CONNECTIONS HAVE BEEN MADE

C Trenching Detail
Scale: 1/2"=1'-0"

1. FINISH GRADE
2. VALVE BOX, SEE SPECS.
3. LINE FLUSHING VALVE TLSOV BY NETAFIM
4. BRICK SUPPORTS (3)
5. ¾" GRAVEL SUMP (1 CUBIC FT.)
6. 17mm PVC LATERAL (OR EXHAUST HEADER)

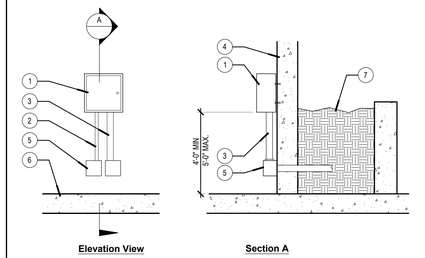
L Manual Line Flushing Valve - Plumbed to PVC
Scale: NTS



1. 10" ROUND VALVE BOX WITH BOLT DOWN COVER, HEAT BRANDED "QCV"
2. WATER ID TAG
3. QUICK COUPLER VALVE - REFER TO IRRIGATION LEGEND
4. FINISH GRADE:
   - 1/2" BELOW BOX LID IN TURF AREAS
   - 1 1/2" BELOW BOX LID IN SHRUB/GC AREAS
5. ONE (1) CU. FT. (MIN.) OF 3/4" CRUSHED ROCK AT BASE OF VALVE BOX
6. SUPPORT - COMMON RED BRICK
7. V.I.T. STAINLESS STEEL TIES - TYPICAL
8. SCH. 80 PVC NIPPLE - LENGTH AS REQUIRED
9. 1" DIA. SCH. 80 PVC SWING JOINT - PREASSEMBLED BY SPEARS
10. PVC MAINLINE
11. 1/2" DIA. x 24" LENGTH GALVANIZED PIPE STAKE
12. SCH. 80 PVC TEE FITTING

NOTES:
A. ALL THREADS SHALL BE WRAPPED WITH TEFLON TAPE
B. 12" MIN. CLEAR SPACE SHALL BE MAINTAINED BETWEEN THE QUICK COUPLER VALVE BOX AND ANY ADJACENT HARDSCAPE - WHERE OCCURS
C. ADD BALL VALVES ON PRIMARY SIDE. TYP. ALL QUICK COUPLERS

H Quick Coupler Valve
Scale: 3/4"=1'-0"



1. IRRIGATION CONTROLLER, PER PLAN. MOUNT TO WALL PER MANUF. SPECS.
2. SCH 80 PVC CONDUIT, SIZE AS REQ., TO 120V POWER SUPPLY.
3. SCH 80 PVC CONDUIT, SIZE AS REQ., FOR IRRIGATION CONTROL WIRES AND MASTER VALVE/FLOW SENSOR WIRES. PROVIDE PVC SWEEP ELL BELOW GRADE.
4. FACE OF WALL ON INSIDE OF GARAGE
5. JUNCTION BOX
6. FINISH SURFACE
7. PLANTER ON OUTSIDE

NOTES:
A. INSTALL ALL WIRING PER LOCAL CODE.
B. ALL CONDUIT ABOVE GRADE TO BE SCH 80 PVC OR RIGID GALV. STEEL.

D Wall Mounted Controller
NTS

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

Chaffey College

HMC Architects
5009006-000
3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

NOT FOR CONSTRUCTION

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT

EPTDESIGN
844 EAST GREEN STREET, SUITE 201
PASADENA, CA 91101
626.795.2006
EPTDESIGN.COM

FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

IRRIGATION DETAILS

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

L2.51

2/13/2020 3:47:43 PM

PLEASE RECYCLE

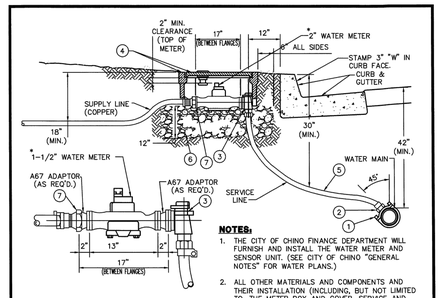
THIS LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG AT THIS PLOTTED SCALE OF 100%

C

LETTERS: 3/4" HIGHWAY FONT & 3/4" ARIAL ITALIC FONT AS SHOWN.

APPROVED	CITY ENGINEER	DATE	CITY OF CHINO PUBLIC WORKS DEPARTMENT	
		4/20/16		
DATE	REVISION	BY	STANDARD DRAWING	No.
			RECYCLED WATER SIGN	485 A

B



NOTES:

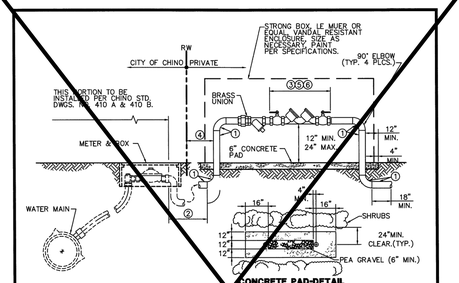
1. THE CITY OF CHINO FINANCE DEPARTMENT WILL FURNISH AND INSTALL THE WATER METER AND SENSOR UNIT. (SEE CITY OF CHINO "GENERAL NOTES" FOR WATER PLANS.)
2. ALL OTHER MATERIALS AND COMPONENTS AND THEIR INSTALLATION (INCLUDING, BUT NOT LIMITED TO, THE METER BOX AND COVER, SERVICE AND SUPPLY LINES, VALVES ADAPTORS, COUPLINGS AND FITTINGS) SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR/DEVELEOPER.
3. WATER METER SHALL BE CENTERED IN THE METER BOX

ITEM	DESCRIPTION	FORD	JONES	MUELLER	REMARKS
1	SERVICE SADDLE	202B	J-979	H16100	ALL SADDLES W/IP THD.
2	CORP. STOP, 2"	FB 1700	J-1935	B-25028	KEY UP OR ON SIDE
3	ANGLE METER STOP, 2"	FV43-777W	J-1975 W	B-24276	W/ELONGATED HOLE FOR 1-1/2"
4	METER BOX & COVER (AS SPECIFIED BY THE CITY ENGINEER)	– – –	– – –	– – –	ARMOR CAST: A500153412 (BOX) A6001643-H9 OR (COVER) A6001643-H7
5	2" COPPER TUBE, TYPE K OR 2" CTS POLYETHELENE TUBE	– –	– –	– –	FULL LENGTH FULL LENGTH
6	1/2" CMB	–	–	–	12" BASE ALL AROUND
7	2" BRONZE METER FLANGE	7F	–	–	

APPROVED	CITY ENGINEER	DATE	CITY OF CHINO PUBLIC WORKS DEPARTMENT	
		3/7/12		
DATE	REVISION	BY	STANDARD DRAWING	No.
			STANDARD WATER SERVICE 1 1/2" OR 2" METER	410 A

A

△ NOT APPLICABLE



CONCRETE PAD-DETAIL

NOTES:

1. ALL PIPE AND FITTINGS SHALL BE COPPER, TYPE K, OR APPROVED EQUAL.
2. NO CONNECTION SHALL BE MADE BETWEEN THE METER AND THE BACKFLOW ASSEMBLY, UNLESS APPROVED IN WRITING BY THE CITY ENGINEER.
3. BACKFLOW ASSEMBLY SHALL BE APPROVED BY THE U.S.C. FOUNDATION FOR CROSS CONNECTION CONTROL.
4. BACKFLOW ASSEMBLY SHALL BE INSTALLED AS CLOSE TO THE PROPERTY LINE AS POSSIBLE. OTHER LOCATIONS SHALL BE APPROVED BY THE CITY ENGINEER.
5. BACKFLOW ASSEMBLY SHALL BE INSTALLED HORIZONTAL AND LEVEL UNLESS AN ALTERNATIVE ORIENTATION IS APPROVED BY U.S.C. FOUNDATION FOR CROSS CONNECTION CONTROL.
6. BACKFLOW ASSEMBLY MAY BE LOCATED WITHIN LANDSCAPE AREAS, OR SCREENED FROM PUBLIC VIEW. LOCATION SHALL BE APPROVED BY THE CITY ENGINEER.
7. BACKFLOW PREVENTION ASSEMBLIES INSTALLED ON A RECYCLED WATER SYSTEM SHALL BE LABELED/MARKED/PAINTED PURPLE (PANTONE #512 OR APPROVED EQUAL).

APPROVED	CITY ENGINEER	DATE	CITY OF CHINO PUBLIC WORKS DEPARTMENT	
		3/7/12		
DATE	REVISION	BY	STANDARD DRAWING	No.
			BACKFLOW PREVENTION ASSEMBLY DOUBLE CHECK DEVICE 2" AND SMALLER	470

NOTES:

1. SIGN MATERIAL: .063" THICK ALUMINUM (6063T-4).
2. SIGN FACE: WHITE REFLECTIVE SHEETING, 3M DIAMOND GRADE OR APPROVED EQUAL, (PER CALIFORNIA D.O.T. MAT'LS SPECIFICATIONS). WITH ANTI-GRAFFITI COATING.

   COLORS:
   - WHITE WILL BE USED FOR LETTERING AND THE PICTOGRAM BACKGROUND.
   - PURPLE (EQUAL TO SPL 71 PERMANENT VIOLET 498) WILL BE USED FOR THE GENERAL BACKGROUND.
   - BLACK WILL BE USED FOR THE PICTOGRAM OUTLINE.
   - RED WILL BE USED FOR THE "PROHIBIT" SYMBOL.
3. SIGN POST INSTALLATION SHALL BE APPROVED BY THE WATER QUALITY TECHNICIAN.
4. LOCATION OF SIGNS SHALL BE APPROVED BY THE CITY ENGINEER.

APPROVED	CITY ENGINEER	DATE	CITY OF CHINO PUBLIC WORKS DEPARTMENT	
		4/20/16		
DATE	REVISION	BY	STANDARD DRAWING	No.
			RECYCLED WATER SIGN	485 B

NOTES:

1. CORP. STOP SHALL BE INSTALLED WITH THE KEY TO THE SIDE ONLY.
2. THE SERVICE SADDLE SHALL BE I.P. THREAD AND INSTALLED ON ALL P.V.C., CAST OR DUCTILE IRON MAINS.
3. TAPS SHALL BE MADE NOT LESS THAN 24" FROM ANY OTHER TAP, COUPLING OR JOINT.
4. ALL FITTINGS SHALL BE COMPRESSION TYPE WITH SET SCREWS. NO FLARED FITTINGS WILL BE PERMITTED.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL THE METER BOX AND SERVICE CONNECTION TO BOTH SIDES OF THE METER. THE CONTRACTOR SHALL FURTHER INSTALL TRACING WIRE TO EVERY WATER SERVICE. THE CITY OF CHINO WILL FURNISH AND INSTALL THE METER AND SENSOR UNIT ONLY.
6. BOTH SERVICE AND CONSUMER LINES SHALL BE INSTALLED PRIOR TO SIDEWALK CONSTRUCTION.
7. SERVICE LINES SHALL NOT PASS BENEATH DRIVE APPROACHES.
8. WATER METERS SHALL BE LOCATED A MINIMUM OF 5' FROM THE PROPERTY LINE AND SHALL BE SET 9" BEHIND THE CURB, OR, WHERE THE SIDEWALK IS ADJACENT TO THE CURB, 9" BEHIND THE SIDEWALK.
9. A MINIMUM 1' PERIMETER AROUND THE THREE REMAINING SIDES SHALL BE KEPT CLEAR OF PAVING, PLANTER WALLS OR OTHER CONSTRUCTION.
10. NO DIRECT TAPS SHALL BE MADE TO MAINS.
11. SERVICE SADDLES SHALL BE BRONZE OR BRASS; FORD 202B FOR A.C. PIPE OR FORD S90 FOR P.V.C. IN HIGH CORROSIVE AREAS USE FORD FC202.
12. A 3" "W" SHALL BE STAMPED IN THE CURB FACE AT SERVICE LOCATIONS.
13. THE SERVICE LINE SHALL BE 2" TYPE K COPPER TUBING OR 2" CTS POLYETHYLENE TUBE. THE MINIMUM BEND RADIUS SHALL BE 12" OR GREATER.
14. STRICT ADHERENCE TO PROVISIONS FOR TESTING AND DISINFECTING WATER LINES SHALL BE FOLLOWED.
15. WHERE BRAND NAMES ARE CALLED OUT, EQUALS MAY BE USED WHEN APPROVED IN WRITING PRIOR TO CONSTRUCTION.
16. ALL ANGLE METER VALVES WITHIN A DEVELOPMENT (TRACT OR PHASE OF A TRACT) MUST BE ADJUSTED TO FINAL GRADE AND LOCATION (RELATIVE TO THE TOP OF THE ADJACENT CURB) WITHIN SEVEN CALENDAR DAYS OF THE INSTALLATION OF THE CURB.
17. ALL COMPONENTS AND MATERIALS SPECIFIED ON THIS STANDARD SHALL BE USED ON BOTH 1-1/2" AND 2" METER INSTALLATIONS.
18. MULTIPLE CONNECTIONS LESS THAN 18" APART SHALL BE STAGGERED.

APPROVED	CITY ENGINEER	DATE	CITY OF CHINO PUBLIC WORKS DEPARTMENT	
		3/7/12		
DATE	REVISION	BY	STANDARD DRAWING	No.
			STANDARD WATER SERVICE 1 1/2" OR 2" METER (NOTES)	410 B

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

Chaffey College

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3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 0979 / www.hmcarchitects.com

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ISSUE

	DESCRIPTION	DATE
△	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT

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PASADENA, CA 91101
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FACILITY:

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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

IRRIGATION DETAILS

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

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PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG AT THIS ORIGINAL PLOTTED SCALE

PLANTING NOTES

1. CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES PRIOR TO START OF WORK. COSTS INCURRED DUE TO DAMAGE OF UTILITIES IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR IF VERIFICATION WAS NOT PERFORMED.

2. CONTRACTOR SHALL NOT WILLFULLY PROCEED WITH PLANTING OPERATIONS WHEN IT IS OBVIOUS THAT UNKNOWN OBSTRUCTIONS AND GRADE DIFFERENCES EXIST THAT MAY NOT HAVE BEEN KNOWN DURING DESIGN PROCESS. BRING SUCH CONDITIONS IMMEDIATELY TO ATTENTION TO OWNER FOR RESOLUTION. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR COSTS INCURRED AND REQUIRED MODIFICATIONS DUE TO LACK OF PROVIDING SUCH NOTIFICATION.

3. CONTRACTOR SHALL APPLY A CONTACT HERBICIDE WHERE WEEDS ARE PRESENT PER MANUFACTURERS SPECIFICATIONS A MINIMUM OF TEN (10) DAYS PRIOR TO COMMENCEMENT OF ANY PLANTING OR IRRIGATION WORK. WEEDS SHALL BE ALLOWED TO COMPLETELY DIE BACK, INCLUDING THE ROOTS BEFORE PROCEEDING WITH WORK. REMOVE WEEDS AND GRASSES AND PROPERLY DISPOSE OF WASTE.

4. CONTRACTOR SHALL ARRANGE FOR SOILS TESTS PER MWELO REQUIREMENT. SEE SOILS MANAGEMENT REPORT NOTE BELOW. ASSUME (1) TEST SITE PER 5,000 S.F. OF LANDSCAPE AREA FOR BIDING PURPOSES. LANDSCAPE ARCHITECT SHALL SELECT LOCATION OF TEST SITES

5. SOILS REPORT SHALL BE SUBMITTED TO LANDSCAPE ARCHITECT FOR REVIEW.

6. BID PURPOSES ONLY ASSUME THE FOLLOWING SOIL PREPARATION AND BACKFILL:
   INCORPORATE THE FOLLOWING MATERIALS INTO ALL LAWN AND PLANTER AREAS PER 1,000 S.F. - MECHANICALLY ROTOTILL MATERIALS INTO AREA AT A DEPTH OF 6". HAND TILLING IS NOT ACCEPTABLE. WATER THOROUGHLY AFTER ROTOTILLING IS COMPLETE.

   3 C.Y. NITROLIZED WOOD SHAVINGS
   15 LB. COMMERCIAL FERTILIZER 15-15-15
   50 LB. AGRICULTURE GYPSUM
   10 LBS. IRON SULFATE

   BACKFILL MIX FOR ALL TREES AND SHRUBS:

   2 PARTS NATIVE ON-SITE SOIL
   1 PART NITROLIZED WOOD SHAVINGS
   1.5 LB./C.Y. COMMERCIAL FERTILIZER 15-15-15
   5 LB. /C.Y. AGRICULTURAL GYPSUM
   1 LB./C.Y. IRON SULFATE
   PLANTING TABLETS AT RATES PER MANUF. SPEC.

   ACTUAL SOILS AMENDMENTS AND BACKFILL SHALL COMPLY WITH THE SOILS MANAGEMENT REPORT.

7. SWEEP DOWN ALL WALKS AFTER AMENDMENTS AND BACKFILL PRIOR TO WATERING TO PREVENT STAINING OF PAVING.

8. ALL CLEARANCE DATA PER LOCAL JURISDICTION'S TREE PLANTING STANDARDS AND GUIDELINES.

9. INSTALL 'DEEP ROOT' (OR APPROVED EQUAL) TREE ROOT BARRIERS ON ALL TREES WITHIN 20'-0" OF SIDEWALKS OR HARD SURFACES. CHECK MANUFACTURERS CALCULATOR CHART FOR NUMBER OF PANELS FOR EACH SIZE TREE. AVAILABLE FROM: DEEP ROOT PARTNERS, LP, 345 LORTON AVENUE, SUITE 305 BURLINGAME, CA, 94010 (800)LV-ROOTS, (415) 344-1464.

10. PROVIDE PHOTOGRAPHS OF PLANT MATERIAL FOR LANDSCAPE ARCHITECT FOR INITIAL APPROVAL.

11. NO SUBSTITUTIONS FOR PLANT MATERIAL SHALL BE MADE WITHOUT PRIOR WRITTEN APPROVAL BY THE LANDSCAPE ARCHITECT. DELIVERY SLIPS FOR PLANT MATERIAL SHALL BE SUBMITTED TO LANDSCAPE ARCHITECT FOR REVIEW.

12. LANDSCAPE ARCHITECT SHALL HAVE THE OPPORTUNITY TO INSPECT AND APPROVE ALL SPECIMEN AND BOX MATERIALS AT JOB SITE PRIOR TO PLANTING. ALL UNACCEPTABLE MATERIAL SHALL BE REMOVED FROM JOB SITE AND REPLACED WITH ACCEPTABLE MATERIAL AT CONTRACTOR'S EXPENSE.

13. PLANTS SHALL NOT BE PLACED WITHIN TWELVE (12) INCHES OF SPRINKLER HEADS.

14. LANDSCAPE ARCHITECT SHALL APPROVE FINAL PLACEMENT OF TREES AND SHRUBS PRIOR TO PLANTING. PERFORM THE FOLLOWING PROCEDURES BEFORE PLANTING PIT EXCAVATION:

    A. SHRUBS - PLACE ACTUAL PLANT CONTAINERS ON SITE IN PRELIMINARY LOCATIONS.
    B. TREES - FIELD MARK LOCATIONS WITH WOOD STAKES BEFORE DIGGING HOLES.CONTRACTOR SHALL
    C. GIVE AT LEAST THREE (3) BUSINESS DAYS NOTICE FOR PLANT LAYOUT APPROVAL.

15. PLANTING OF GROUNDCOVER SHALL BE CONTINUOUS UNDER ALL SHRUBS IN ALL PLANTER AREAS THROUGHOUT THE SITE UNLESS OTHERWISE INDICATED.

16. LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL THEFT OR DAMAGE TO PLANT MATERIAL ONCE PLANT MATERIAL IS DELIVERED TO THE JOB SITE.

17. A REPRESENTATIVE OF THE BOTANICAL NAME TAGS, FURNISHED BY THE NURSERY STOCK SUPPLIER, SHALL REMAIN ATTACHED TO THE PLANTS UNTIL FINAL INSPECTION.

18. PROVIDE SAMPLES OF DECOMPOSED GRANITE, GRAVEL, PEBBLE, OR ROCK INSTALLED PER DETAILS FOR APPROVAL BY LANDSCAPE ARCHITECT.

19. AFTER PLANTING IS COMPLETE BUT PRIOR TO INSTALLING MULCH, APPLY GRANULAR PRE-EMERGENT AT MANUFACTURER SUGGESTED RATE, RONSTAR OR SNAPSHOT OR EQUAL.

20. IN ALL SHRUB AND GROUNDCOVER AREAS APPLY 3" MIN. LAYER OF FOREST FLOOR BARK MULCH AGUINAGA GREEN, INC. OR EQUAL. CONTRACTOR SHALL SUBMIT SAMPLE TO LANDSCAPE ARCHITECT FOR APPROVAL. DO NOT INSTALL MULCH IN AREAS OF GROUNDCOVERS THAT ARE LESS THAN 3" TALL AT MATURITY.

21. ALL AREAS SHALL BE GRADED TO SLOPE TO CATCH BASINS OR FLOW LINES AS INDICATED ON THE PLANS OR AS DIRECTED BY THE LANDSCAPE ARCHITECT. SOIL SHALL BE 1 1/2" BELOW ADJACENT HEADERS AND PAVING IN GROUNDCOVER AREAS AND 1/2" IN TURF, AND AREAS OF GROUNDCOVERS THAT ARE LESS THAN 3" TALL AT MATURITY.

22. INSTALL JUTE NETTING ON SLOPES OF 2:1 OR STEEPER, UNLESS OTHERWISE INDICATED.

23. UPON COMPLETION OF ALL PLANTING OPERATIONS, THE PORTION OF THE PROJECT USED FOR THE APPARATUS OF THIS WORK SHALL BE CLEANED OF ALL DEBRIS, SUPERFLUOUS MATERIAL AND EQUIPMENT. ALL SUCH MATERIALS AND EQUIPMENT SHALL BE ENTIRELY REMOVED FROM THE PROJECT SITE. PAVING SHALL BE WASHED CLEAN AT THE COMPLETION OF WORK.

24. UPON COMPLETION OF PLANTING, THE CONTRACTOR SHALL ARRANGE FOR A SUBSTANTIAL COMPLETION INSPECTION BY LANDSCAPE ARCHITECT. CONTRACTOR SHALL CORRECT ANY DISCREPANCIES FOUND PRIOR TO FINAL INSPECTION AND ACCEPTANCE OF THE PROJECT.

25. UPON COMPLETION OF PROJECT, CONTRACTOR SHALL PROVIDE DOCUMENTATION VERIFYING IMPLEMENTATION OF RECOMMENDATIONS FROM SOILS MANAGEMENT REPORT.

26. GUARANTEE: ALL PLANT MATERIAL SHALL BE GUARANTEED FOR REPLACEMENT AFTER FINAL INSPECTION AS FOLLOWS:
    5 GAL. AND SMALLER-90 DAYS
    15 GAL. AND LARGER-ONE YEAR

27. MAINTENANCE PERIOD: CONTRACTOR SHALL MAINTAIN GUARANTEED PLANTS FOR 90 DAYS FROM SUBSTANTIAL COMPLETION AS DEEMED BY THE LANDSCAPE ARCHITECT.

28. REPLACE OR REPAIR EXISTING MATERIALS THAT ARE DAMAGED BY CONTRACTOR DURING PLANTING OPERATIONS.

29. UPON FINAL ACCEPTANCE OF THE WORK, THE CONTRACTOR SHALL SUBMIT TO THE OWNER SIGNED ORIGINALS OF ALL MATERIALS AND LABOR RELEASES.

30. PLANT QUANTITIES IN LEGEND ARE FOR REFERENCE ONLY, CONTRACTOR TO PROVIDE AND INSTALL ALL PLANT MATERIAL SHOWN ON PLANS.

SOIL MANAGEMENT REPORT NOTES

1. AFTER MASS GRADING IS COMPLETE, CONTRACTOR SHALL SUBMIT SOIL SAMPLES TO A CERTIFIED LABORATORY FOR ANALYSIS AND RECOMMENDATIONS.

2. SOIL ANALYSIS SHALL INCLUDE:

   A. SOIL TEXTURE
   B. INDICATE INFILTRATION RATE
   C. INDICATE pH
   D. TOTAL SOLUBLE SALTS
   E. SODIUM
   F. PERCENT ORGANIC MATTER
   G. RECOMMENDATIONS

3. SUBMIT ANALYSIS REPORT TO LANDSCAPE ARCHITECT FOR REVIEW OF PLANTING AND IRRIGATION PLANS.

4. CONTRACTOR SHALL PROVIDE DOCUMENTATION VERIFYING IMPLEMENTATION OF SOIL ANALYSIS REPORT RECOMMENDATION TO THE PROJECT APPLICANT TO SUBMIT TO THE LOCAL AGENCY AS PART OF THE CERTIFICATE OF COMPLETION.

PLANTING LEGEND: Trees

SYMBOL	NAME	SIZE	QTY	WATER REQ.	DETAIL
	AESCULUS CALIFORNICA CALIFORNIA BUCKEYE	24" BOX	4	LOW	C / L3.51
	BRACHYCHITON POPULNEUS KURRAJONG	48" BOX	7	LOW	C / L3.51
	JUGLANS CALIFORNICA VAR . CALIFORNICA/ SOUTHERN CALIFORNIA BLACK WALNUT	24" BOX	3	LOW	C / L3.51
	LAGERSTROEMIA 'NATCHEZ' NATCHEZ CRAPE MYRTLE	36" BOX	6	MOD	C / L3.51
	MELALEUCA QUINQUENERVIA CAJEPUT TREE	48" BOX	7	MOD	C / L3.51
	PODOCARPUS GRACILIOR FERN PINE	24" BOX	23	MOD	C / L3.51
	QUERCUS AGRIFOLIA COAST LIVE OAK	48" BOX 60" BOX	11 1	LOW	C / L3.51
	QUERCUS LOBATA VALLEY OAK	48" BOX	31	MOD	C / L3.51
	TIPUANA TIPU TIPU TREE	60" BOX	1	MOD	C / L3.51

PLANTING LEGEND: Shrubs & Vine

SYMBOL	NAME	SIZE	QTY	WATER REQ.	DETAIL
	ASPARGUS DENSIFLORUS 'MYERS' ASPARAGUS FERN	5 GAL @ 3' O.C.	193	MOD	A / L3.51
	BACCHARIS PILULARIS 'PIGEON POINT' PIGEON POINT COYOTE BRUSH	1 GAL @ 4' O.C.	467	LOW	A / L3.51
	CHONDROPETALUM TECTORUM SMALL CAPE RUSH	1 GAL @ 4' O.C.	68	MOD	A / L3.51
	DASYLIRION LONGISSIMUM MEXICAN GRASS TREE	15 GAL @ 5' O.C.	7	LOW	A / L3.51
	DENDROMECON HARFORDII ISLAND BUSH POPPY	15 GAL PER PLAN	7	LOW	A / L3.51
	DISTICTIS BUCCINATORIA RED TRUMPET VINE	5 GAL @ 12' O.C.	29	MOD	A / L3.51
	ECHIUM CANDICANS PRIDE OF MADEIRA	1 GAL @ 4' O.C.	58	LOW	A / L3.51
	ENCELIA FARINOSA BRITTLE BUSH	1 GAL @ 30" O.C.	23	VERY LOW	A / L3.51
	ERIOGONUM CINEREUM ASHY LEAF BUCKWHEAT	5 GAL @ 30" O.C.	49	LOW	A / L3.51
	ERIOGONUM FASCICULATUM CALIFORNIA BUCKWHEAT	1 GAL @ 3' O.C.	387	LOW	A / L3.51
	ERIOGONUM GIGANTEUM SAINT CHATHERINE'S LACE	5 GAL @ 48" O.C.	116	LOW	A / L3.51
	GALVEZIA SPECIOSA 'BOCAROSA' BOCAROSA ISLAND SNAPDRAGON	1 GAL @ 3' O.C.	144	LOW	A / L3.51
	LOBELIA LAXIFLORA MEXICAN LOBELIA	1 GAL @ 4' O.C.	70	LOW	A / L3.51
	LOMANDRA LONGIFOLIA BREEZE BREEZE MAT RUSH	1 GAL @ 36" O.C.	60	MOD	A / L3.51
	LOMANDRA LONGIFOLIA NYALLA NYALLA MAT RUSH	1 GAL @ 36" O.C.	54	MOD	A / L3.51
	LOMANDRA LIME TUFF LIME TUFF MAT RUSH	1 GAL @ 30" O.C.	51	MOD	A / L3.51
	RHAMNUS C. 'MOUND SAN BRUNO' MOUND SAN BRUNO COFFEEBERRY	5 GAL @ 36" O.C.	73	LOW	A / L3.51
	ROMNEYA COULTERI CALIFORNIA TREE POPPY	1 GAL @ 4' O.C.	23	VERY LOW	A / L3.51
	SALVIA 'BEE'S BLISS' BEE'S BLISS SAGE	1 GAL @ 4' O.C.	161	LOW	A / L3.51
	SALVIA 'MRS. BEARD' MRS. BEARD CREEPING SAGE	1 GAL @ 4' O.C.	137	LOW	A / L3.51
	SALVIA APIANA WHITE SAGE	1 GAL @ 36" O.C.	36	LOW	A / L3.51
	SALVIA MEXICANA 'LIMELIGHT' LIMELIGHT MEXICAN SAGE	5 GAL @ 36" O.C.	52	LOW	A / L3.51
	SALVIA MELLIFERA 'CALAMITY JANE' CALAMITY JANE BLACK SAGE	5 GAL @ 48" O.C.	76	LOW	A / L3.51
	SENNA ARTEMISIOIDES FEATHERY CASSIA	5 GAL @ 48" O.C.	26	LOW	A / L3.51

PLANTING LEGEND: Turf and Groundcover

SYMBOL	NAME	SIZE	QTY	WATER REQ.	DETAIL
	BULLSEYE BERMUDA GRASS	SOD	19,283 s.f.	HIGH	-
	ACHILLEA MILLEFOLIUM YARROW	1 GAL @ 24" O.C.	1,117 s.f.	LOW	D/ L3.51
	CAREX DIVULSA EUROPEAN GREY SEDGE	1 GAL @ 18" O.C.	4,414 s.f.	LOW	D/ L3.51
	CAREX PRAEGRACILIS CALIFORNIA FIELD SEDGE	1 GAL @ 18" O.C.	263 s.f.	LOW	D/ L3.51
	DIANELLA BLUTOPIA BLUTOPIA FLAX LILY	1 GAL @ 18" O.C.	298 s.f.	MOD	D/ L3.51
	JUNCUS PATENS CALIFORNIA GREY RUSH	1 GAL @ 2' O.C.	780 s.f.	LOW	D/ L3.51
	JUNCUS PATENS 'ELK BLUE' ELK BLUE CALIFORNIA GREY RUSH	1 GAL @ 2' O.C.	896 s.f.	LOW	D/ L3.51

PLANTING LEGEND: Gravel

SYMBOL	NAME	SIZE	NOTES	DETAIL
	CRUSHED GRAVEL, BLUESTONE	¾"	ANGULAR, NOT ROUNDED	G, H / L3.51
	CRUSHED GRAVEL, PEWTER GRAY	¾"	ANGULAR, NOT ROUNDED	G, H, I / L3.51
	BLASTED GRANITE BOULDERS TOTAL QTY: 12. SW BOULDER & STONE	4 @ 3' LONG; 4 @ 4' LONG; 4 @ 5' LONG		-

AGENCY APPROVAL:

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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

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5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

PLANTING SCHEDULE AND NOTES

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

L3.00

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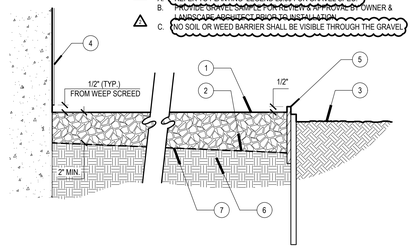
PLANTING SCHEDULE AND NOTES

PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON ALL SHEETS ORIGINAL PAPER SIZE

1. GRAVEL PAVING PER PLAN.
2. SURFACE OF COMPACTED SUB-GRADE SHALL SLOPE AWAY FROM BUILDING, SEE C3.00 GRADING PLAN
3. FINISH GRADE PER PLAN: -½" @ TURF AREAS. -1-½" @ SHRUB AREAS.
4. ADJACENT FACE OF BUILDING
5. STEEL LANDSCAPE EDGING PER PLAN. SEE REFERENCE LEGEND/L1.00 FOR MORE INFORMATION
6. SUB-GRADE PER GEOTECHNICAL REPORT
7. MIRAFI 600X FABRIC WEED BARRIER

A. REFER TO PLANTING LEGEND L3.00 FOR GRAVEL SPEC.
B. PROVIDE GRAVEL SAMPLE FOR REVIEW & APPROVAL BY OWNER & LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
C. NO SOIL OR WEED BARRIER SHALL BE VISIBLE THROUGH THE GRAVEL.

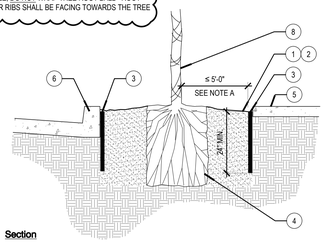


I Gravel Maintenance Strip
Scale: 1 1/2"-1'-0"

1. FINISH GRADE PER GRADING PLAN. INSTALL TREE HEIGHT ACCORDINGLY. ACCOUNT FOR SOIL TOPPING.
2. SOIL TOPPING PER PLANTING PLAN.
3. 24" MIN. HIGH ROOT CONTROL BARRIER PER PLANTING NOTES. UNLESS SPECIFIED OTHERWISE. TOP OF BARRIER SHALL ½" BELOW FINISH GRADE AND SHALL NOT BE VISIBLE.
4. TREE ROOTBALL
5. ADJACENT HARDSCAPE
6. CONCRETE CURB AND GUTTER WHERE APPLICABLE
7. MATURE DRIP LINE OF TREE AS SHOWN PER PLAN.
8. TREE TRUNK

A. NOTES:
USE ROOT BARRIERS EVERYWHERE THE EDGE OF TREE ROOTBALL IS LOCATED 5' OR LESS FROM THE EDGE OF FLATWORK, OR 20' OR LESS FROM STRUCTURES OR MAJOR UTILITIES (ELECTRIC, FIBEROPTIC, SEWER AND GAS LINES, WATER MAINLINES, AND EQUIPMENT VAULTS). POSITION ROOT BARRIER AS CLOSE TO CURB/PAVING AS POSSIBLE. DO NOT WRAP TREE ROOT BALL - ROOT BARRIER RIBS SHALL BE FACING TOWARDS THE TREE

D. LENGTH OF ROOT BARRIER SHALL BE EQUAL TO THE MATURE DRIPLINE OF THE PARTICULAR TREE TO BE PLANTED AS DEFINED BY PLANTING PLAN SYMBOL SIZE, NOT BY THE INSTALLED SIZE.
E. APPLY MASTIC SEALER TO JOINT BETWEEN CONCRETE SURFACE AND ROOT BARRIER FOR ADDED ROOT PROTECTION AND TO AVOID SOIL AND DEBRIS FROM BEING TRAPPED BETWEEN BARRIER AND CONCRETE.
F. ROOT BARRIER TO BE CONTINUOUS WHERE MULTIPLE TREES ARE ALIGNED AND MEET CRITERIA OF NOTE A.
G. INSTALL PER MANUFACTURERS RECOMMENDATIONS.
H. WHERE A ROLLED BARRIER IS APPROVED, CONTRACTOR MUST EXTEND THE BARRIER TO FLATTEN AND UNCOIL PRIOR TO INSTALLATION. CONTRACTOR MUST OVERLAP ROOT BARRIERS BY 1" MINIMUM WHERE CONTINUOUS AND NOT INTERLOCKING.



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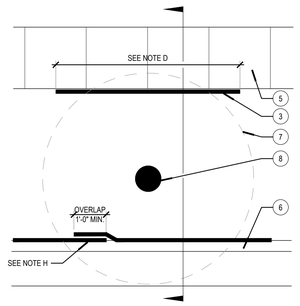
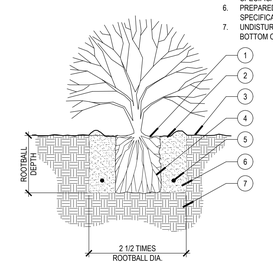


Plan View

F Linear Root Barrier
Scale: 1/2"=1'-0"

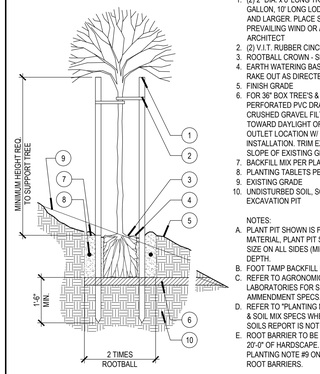
1. CROWN OF SHRUB TO BE PLANTED 1" ABOVE FINISH GRADE
2. EARTH WATERING BASIN, NO LARGER THAN ROOTBALL. RAKE OUT AS DIRECTED.
3. FINISH GRADE
4. ROOTBALL
5. FERTILIZER TABLETS, REFER TO SPECIFICATIONS
6. PREPARED BACKFILL MIX PER SPECIFICATIONS
7. UNDISTURBED SOIL. SCARIFY SIDES AND BOTTOM OF PIT



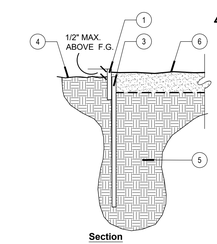
A Shrub planting
Scale: NTS

1. (2) 2" DIA. x 8' LONG TREATED LODGEPOLE STAKES FOR 5 GALLON, 10' LONG LODGEPOLE STAKES FOR 15 GALLON AND LARGER. PLACE STAKES AT RIGHT ANGLE TO PREVAILING WIND OR AS DIRECTED BY LANDSCAPE ARCHITECT
2. (2) V.I.T. RUBBER CINCH TIES, SIZE PER BOX SIZE
3. ROOTBALL CROWN - SET @ 2" ABOVE FINISH GRADE
4. EARTH WATERING BASIN, (NO LARGER THAN ROOTBALL) - RAKE OUT AS DIRECTED
5. FINISH GRADE
6. FOR 36" BOX TREE'S & LARGER, INSTALL 2" DIA. PERFORATED PVC DRAIN PIPE (SCH. 40) WRAPPED W/ CRUSHED GRAVEL FILTER SOCK @ BOTTOM OF PIT. SLOPE TOWARD DAYLIGHT OF NEAREST SLOPE AREA & CONFIRM OUTLET LOCATION W/ LANDSCAPE ARCH. PRIOR TO INSTALLATION. TRIM EXPOSED END OF PIPE TO MATCH SLOPE OF EXISTING GRADE.
7. BACKFILL MIX PER PLANTING SPECIFICATIONS
8. PLANTING TABLETS PER PLANTING SPECIFICATIONS
9. EXISTING GRADE
10. UNDISTURBED SOIL, SCARIFY SIDES & BOTTOM OF TREE EXCAVATION PIT

NOTES:
A. PLANT PIT SHOWN IS FOR 15 GALLON SIZE - FOR LARGER MATERIAL, PLANT PIT SHALL BE 18" LARGER THAN BOX SIZE ON ALL SIDES (MINIMUM) AND NO DEEPER THAN BOX DEPTH.
B. FOOT TAMP BACKFILL LIGHTLY IN 6"-10" LIFTS
C. REFER TO AGRONOMIC SOILS REPORT FROM WALLACE LABORATORIES FOR SITE SPECIFIC BACKFILL MIX & SOIL AMMENDMENT SPECS.
D. REFER TO "PLANTING NOTES" ON L3.00 FOR ALL PLANTING & SOIL MIX SPECS WHERE A SITE-SPECIFIC AGRONOMIC SOILS REPORT IS NOT PROVIDED.
E. ROOT BARRIER TO BE INSTALLED FOR ALL TREES WITHIN 20'-0" OF HARDSCAPE. SEE DETAIL F, THIS SHEET, AND PLANTING NOTE #9 ON L3.00 FOR MORE INFORMATION ON ROOT BARRIERS.



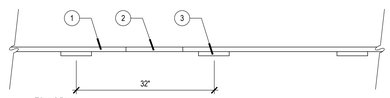
B Slope Tree Planting and Staking with Drainage
Scale: 1/2"=1'-0"



1. STEEL HEADER. SEE REFERENCE LEGEND/L1.00 FOR MORE INFORMATION
2. FINISH GRADE
3. STEEL STAKE
4. FINISH GRADE
5. SUBGRADE AND SUBBASE PER GEOTECH REPORT
6. DECOMPOSED GRANITE OR GRAVEL PER PLAN

NOTES:
A. HEADER AND STAKES TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS

Section

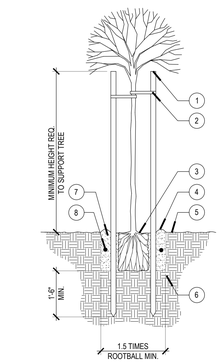


Plan View

G Steel Header
Scale: 1 1/2"-1'-0"

1. (2) 3" DIAMETER X 8' LONG LODGEPOLE TREE STAKE. PLACE STAKES AT RIGHT ANGLE TO PREVAILING WIND OR AS DIRECTED BY LANDSCAPE ARCHITECT.
2. (2) RUBBER V.I.T. CINCH-TIES, SIZE PER BOX SIZE.
3. ROOTBALL CROWN 2" ABOVE FINISH GRADE.
4. EARTH WATERING BASIN, NO LARGER THAN ROOTBALL. RAKE OUT AS DIRECTED.
5. FINISH GRADE.
6. UNDISTURBED SOIL. SCARIFY SIDES AND BOTTOM OF PIT.
7. BACKFILL MIX PER PLANTING SPECIFICATIONS. PLANTING TABLETS PER PLANTING SPECIFICATIONS.

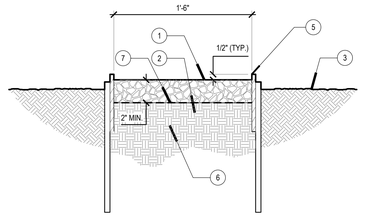
NOTES:
A. FOOT TAMP BACKFILL LIGHTLY IN 6"-10" LIFTS.
B. MAINTAIN A MIN. 1'-0" RADIUS CLEAR EARTH AREA AROUND TRUNK IN TURF.
C. ROOT BARRIER TO BE INSTALLED FOR ALL TREES WITHIN 20'-0" OF HARDSCAPE. SEE DETAIL F, THIS SHEET, AND PLANTING NOTE #9 ON L3.00 FOR MORE INFORMATION ON ROOT BARRIERS.



C Tree Planting and Staking
Scale: 1/2"=1'-0"

1. GRAVEL PAVING PER PLAN
2. SURFACE OF SUBGRADE SHALL SLOPE AWAY FROM BUILDING. DRAIN LOCATIONS PER CIVIL.
3. FINISH GRADE PER PLAN:
   -½" BELOW F.S. FOR TURF AREAS
   -1-½" BELOW F.S. FOR SHRUB AREAS
4. ADJACENT FACE OF BUILDING
5. STEEL LANDSCAPE EDGING PER PLAN. REFER TO REFERENCE LEGEND/L1.00 FOR MORE INFORMATION
6. SUB-GRADE PER GEOTECHNICAL REPORT
7. MIRAFI 600X FABRIC WEED BARRIER

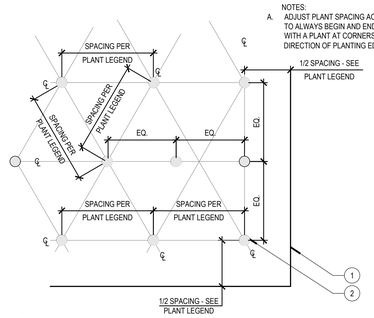
NOTES:
A. REFER TO PLANTING LEGEND FOR GRAVEL SPEC.
B. PROVIDE GRAVEL SAMPLE FOR REVIEW & APPROVAL BY OWNER & LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
C. NO SOIL OR WEED BARRIER SHALL BE VISIBLE THROUGH THE GRAVEL.



H Gravel Strip between Planting Rows
Scale: 1 1/2"-1'-0"

1. PLANTING EDGE (i.e., EDGE OF CURB OR PAVING, FACE OF WALL, ETC
2. CENTER OF PLANT ROOTBALL

NOTES:
A. ADJUST PLANT SPACING ACCORDINGLY TO ALWAYS BEGIN AND END SPACING WITH A PLANT AT CORNERS/CHANGES IN DIRECTION OF PLANTING EDGE.



D Triangular Plant Spacing
Scale: 1/2"=1'-0"

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REVIEWING AGENCIES STAMP HERE

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NOT FOR CONSTRUCTION

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT

EPTDESIGN
844 EAST GREEN STREET, SUITE 201
PASADENA, CA 91101
626.795.2008
EPTDESIGN.COM

FACILITY:

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PROJECT:

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SHEET NAME:

PLANTING DETAILS

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

L3.51

2/13/2023, 3:47:43 PM

PLEASE RECYCLE

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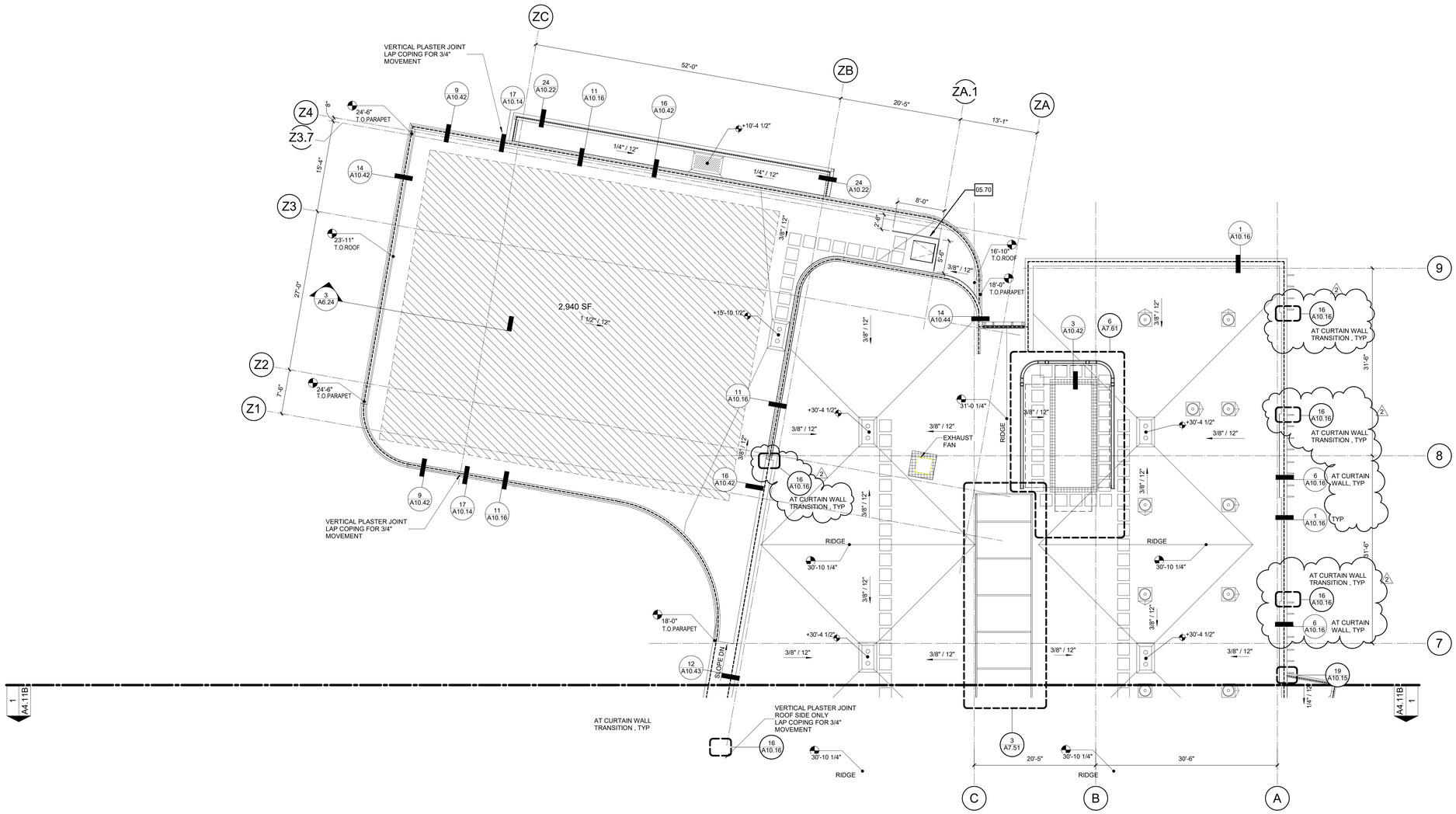

ROOF PLAN - SEGMENT A

1 1/8" = 1'-0"

PN

PLEASE RECYCLE

2/10/2022 10:25:52 AM

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LICENSED ARCHITECT KENNETH SALYER NO. C-19082 REN. 11-30-22 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

05.70 METAL GUARD RAIL AT ROOF HATCH | 13A10.41

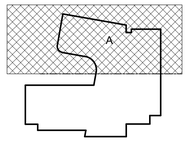
LEGENDS

- WALK PADS
- ROOF ACCESS HATCH - 21 / A10.41
- TUBULAR SKYLIGHTS - 21 / A10.44, 23 / A10.44
- DIRECTION OF ROOF SLOPE 1/4" PER FT MIN.
- ROOF AND OVERFLOW DRAIN - 12 / A10.41
- DESIGNATED FUTURE PV AREA (INSTALLATION OF FUTURE PV PANELS WILL BE UNDER SEPARATE DSA APPLICATION)
- FLAT STRIP BIRD DETERRANT SYSTEM, TWO ROWS - 8 / A10.41
- FLAT STRIP BIRD DETERRANT GEL - 9 / A10.41

NOTES

1. FOR ROOF ASSEMBLY, FLASHING, CURB, PENETRATIONS, EQUIPMENT PLATFORM DETAILS, ETC, REFER TO A10.41, A10.42, A10.43, A10.44
2. ALL ROOF FLASHING TO BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS AND RECOMMENDATIONS
3. PARAPET WALL FRAMING TO BE WALL TYPE, AS6A, UNO.

KEY PLAN:



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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ROOF PLAN - SEGMENT A

ADDENDUM #2

FILE NO.: **36-C1** A# : **04-119722**

DATE: **08.05.2021** CLIENT PROJ NO:

SHEET:

A4.11A

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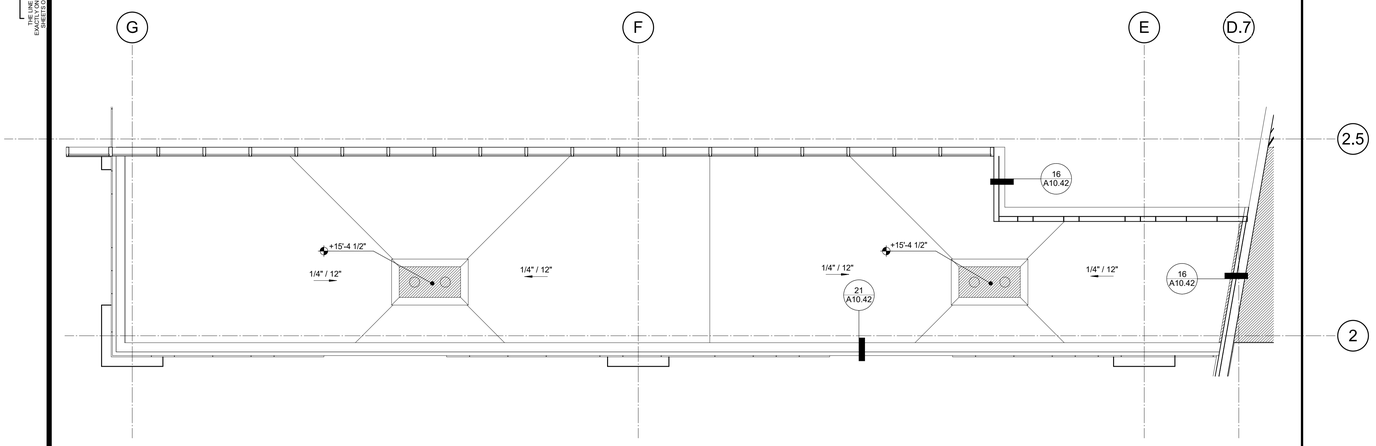
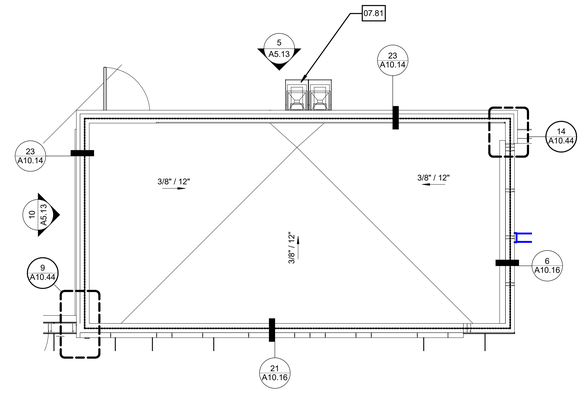
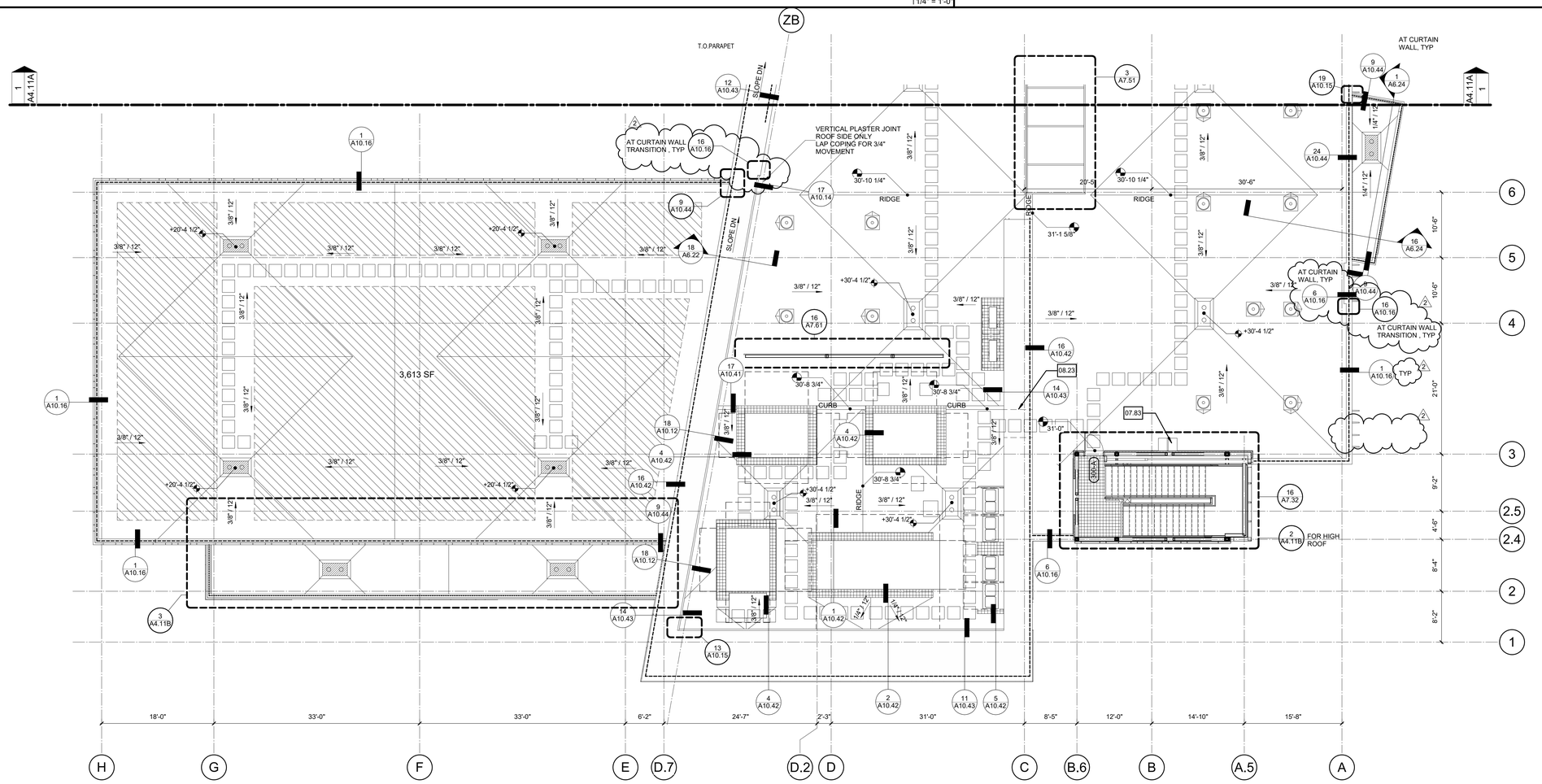


LOWER ROOF AT SUCCESS CENTER | 3
1/4" = 1'-0"



ROOF PLAN - PARTIAL - SOUTH STAIR | 2
1/4" = 1'-0"



ROOF PLAN - SEGMENT B | 1
1/8" = 1'-0"

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LICENSED ARCHITECT KENNETH SALYER NO. C-19082 REN. 11-30-21 STATE OF CALIFORNIA

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Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

07.81	DOWNSPOUT | 5/A10.43
07.83	SPLASH PAN AT DOWNSPOUT | 6/A10.43
08.23	WALL OPENING | SEE BUILDING SECTIONS

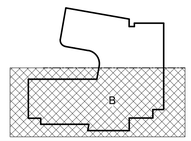
LEGENDS

- WALK PADS
- ROOF ACCESS HATCH - 21 / A10.41
- TUBULAR SKYLIGHTS - 21 / A10.44, 23 / A10.44
- DIRECTION OF ROOF SLOPE 1/4" PER FT MIN.
- ROOF AND OVERFLOW DRAIN - 12 / A10.41
- DESIGNATED FUTURE PV AREA (INSTALLATION OF FUTURE PV PANELS WILL BE UNDER SEPARATE DSA APPLICATION)
- FLAT STRIP BIRD DETERRANT SYSTEM, TWO ROWS - 8 / A10.41
- FLAT STRIP BIRD DETERRANT GEL - 9 / A10.41

NOTES

1. FOR ROOF ASSEMBLY, FLASHING, CURB, PENETRATIONS, EQUIPMENT PLATFORM DETAILS, ETC, REFER TO A10.41, A10.42, A10.43, A10.44
2. ALL ROOF FLASHING TO BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS AND RECOMMENDATIONS
3. PARAPET WALL FRAMING TO BE WALL TYPE, AS6A, UNO.

KEY PLAN:



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PROJECT:

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SHEET NAME:

ROOF PLAN - SEGMENT B

ADDENDUM #2

FILE NO.: **36-C1** | A# : **04-119722**

DATE: **08.05.2021** | CLIENT PROJ NO:

SHEET:

A4.11B

2/10/2022 10:21:24 AM

PLEASE RECYCLE

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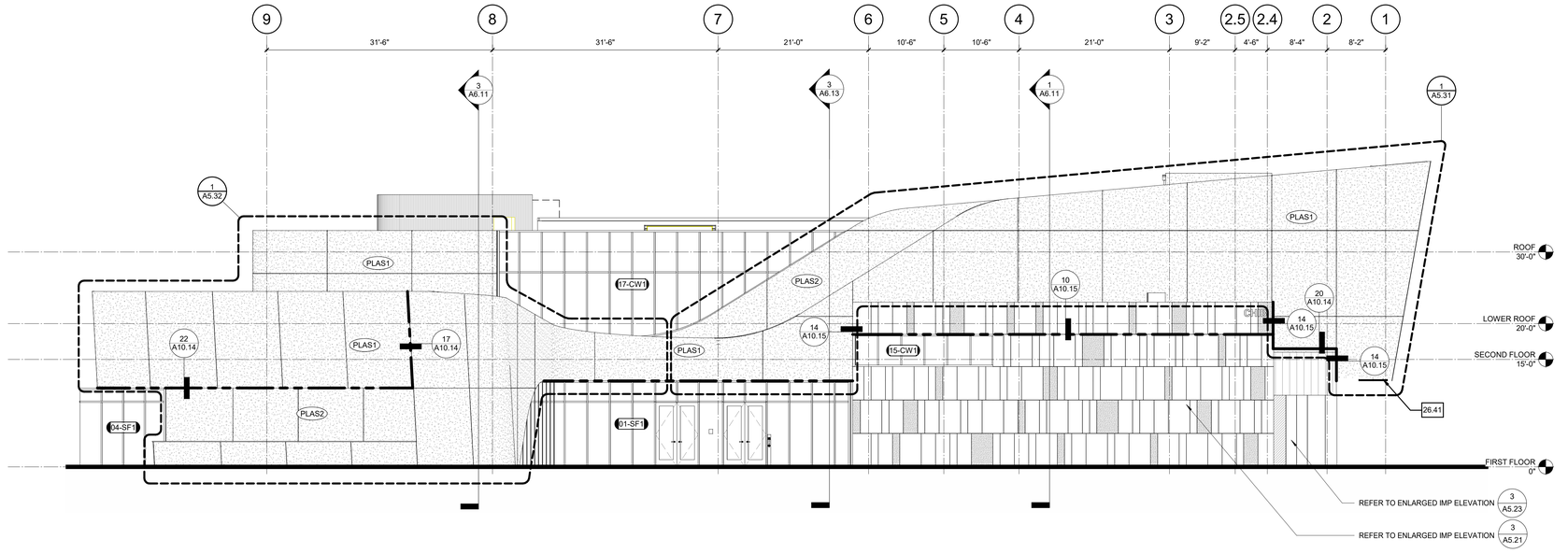
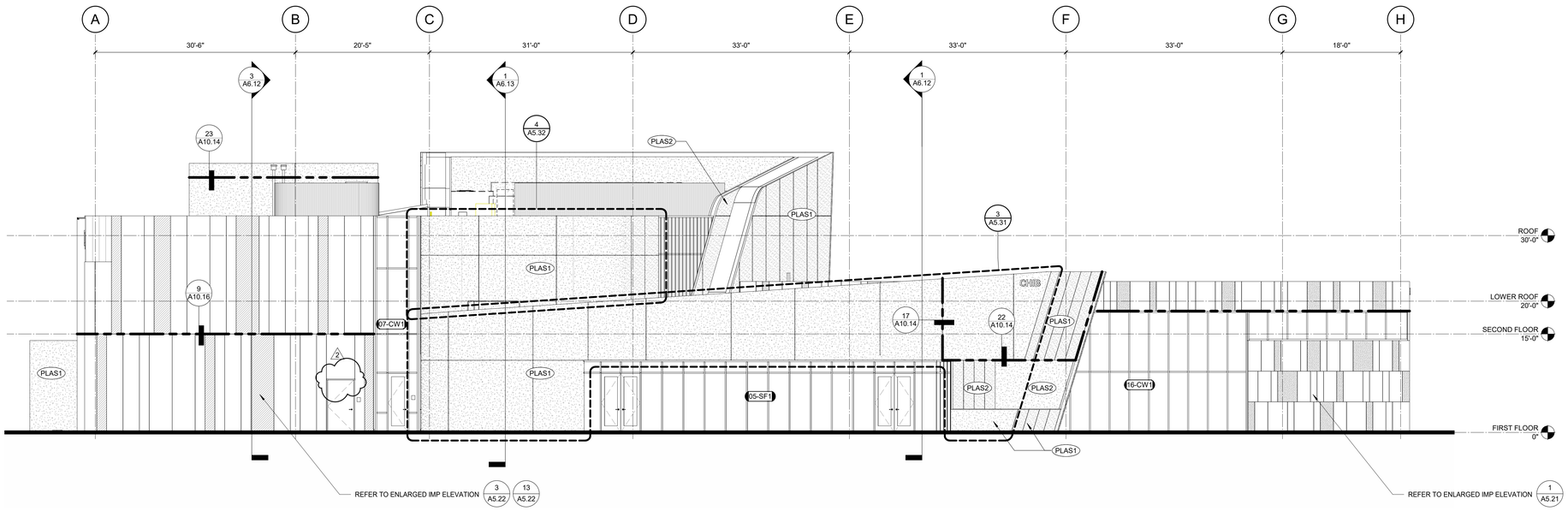


ELEVATION - EXTERIOR - WEST

3 1/8" = 1'-0"



ELEVATION - EXTERIOR - NORTH

1 1/8" = 1'-0"

2/8/2022 7:42:24 PM

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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

26.41 LIGHT FIXTURE | ELECTRICAL

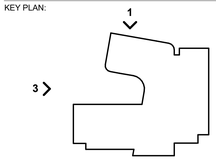
LEGENDS

- INSULATED METAL PANEL REFER - 1 / A10.15 TO TYP. ASSEMBLY DETAIL
- INSULATED METAL PANEL - 1 / A10.15 REFER TO TYP. ASSEMBLY DETAIL
- INSULATED METAL PANELL - 1 / A10.15 REFER TO TYP. ASSEMBLY DETAIL
- EXTERIOR PLASTER - 1 / A10.14 REFER TO TYP ASSEMBLY DETAIL
- PLASTER CONTROL JOINTS - 2 / A10.14
- DRIFT JOINT - REFER TO STRUCTURAL FOR ADDITIONAL INFORMATION
- EP1 — MATERIAL FINISH TAG - REFER TO MATERIAL FINISH SCHEDULE AND SPECIFICATIONS

NOTES

1. REFER TO SHEET G0.11 FOR TYPICAL SYMBOLS AND ABBREVIATIONS
2. REFER TO SHEET A5.21, A5.22, A5.23 FOR ADDITIONAL INFORMATION ON INSULATED METAL PANEL SIZES & COLORS.
3. REFER TO STRUCTURAL EXTERIOR STUD ELEVATIONS FOR LOCATION OF DRIFT JOINT AND VERTICAL JOINT WHERE OCCURS.

KEY PLAN:



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PROJECT:

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SHEET NAME:

EXTERIOR ELEVATIONS

ADDENDUM #2

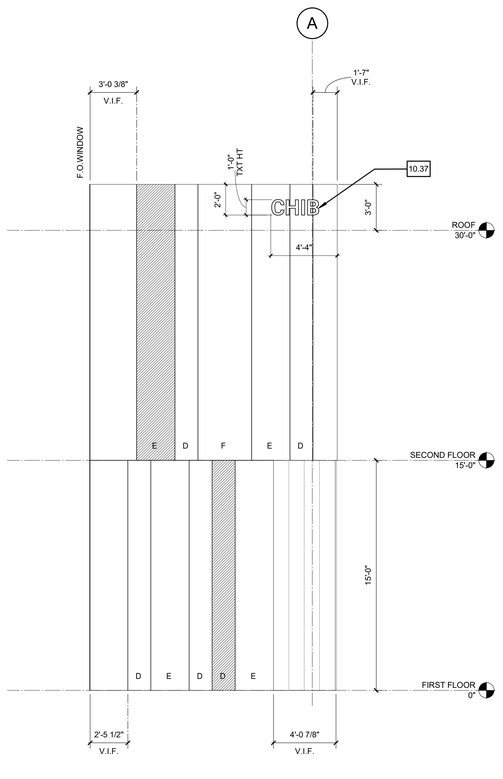
FILE NO.: 36-C1 | A# : 04-119722

DATE: 08.05.2021 | CLIENT PROJ NO:

SHEET:

A5.11

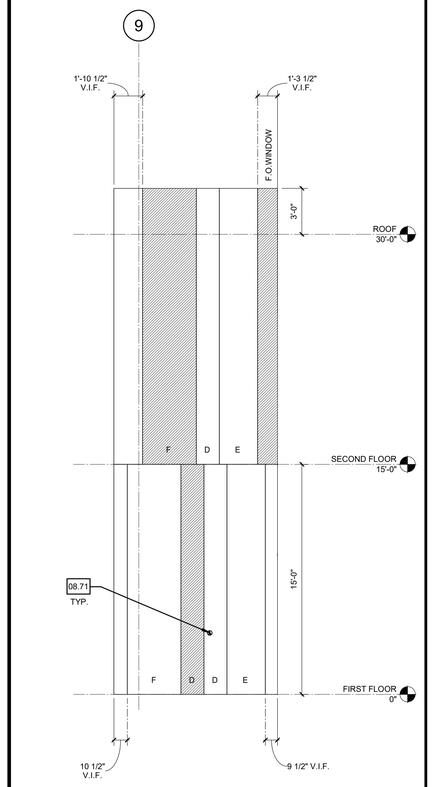
THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL SIZE (D)



INSULATED METAL PANELS - PARTIAL ELEVATION - SOUTH

18

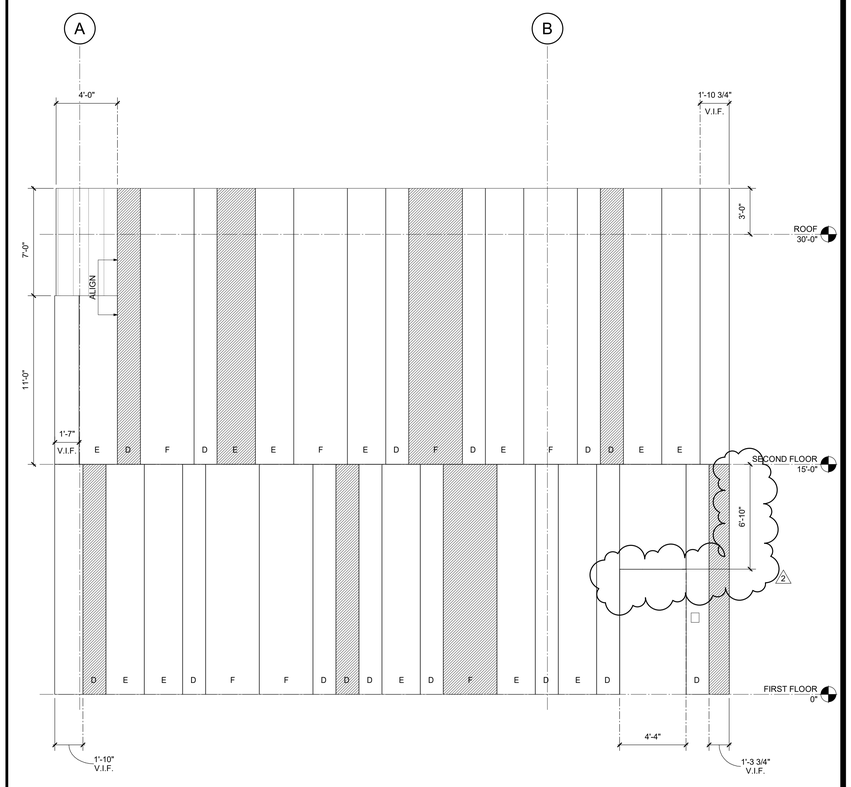
1/4" = 1'-0"



INSULATED METAL PANELS - PARTIAL ELEVATION - WEST

13

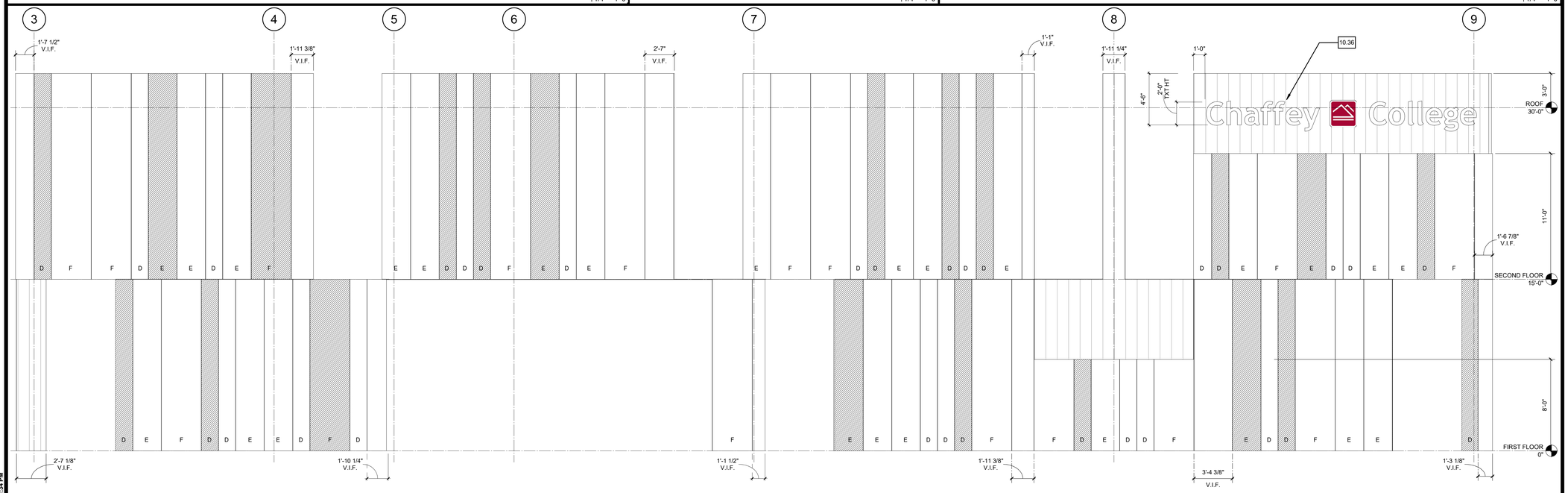
1/4" = 1'-0"



INSULATED METAL PANELS - PARTIAL ELEVATION - NORTH

3

1/4" = 1'-0"



INSULATED METAL PANELS - PARTIAL ELEVATION - EAST

1

1/4" = 1'-0"

PLEASE RECYCLE

2/9/2022 7:41:34 PM

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LICENSED ARCHITECT
KENNETH SALYER
NO. C-19082
REN. 11-30-23
STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

08.71	ADA PUSH PLATE | HARDWARE SCHEDULE
10.36	INDIVIDUAL CAST ALUMINUM SIGN - EXTERIOR | 14/A10.81
10.37	INDIVIDUAL FLAT CUT ALUMINUM SIGN - EXTERIOR | 15/A10.81

LEGENDS

PANEL TYPES

IMP1 IMP2 IMP3 IMP4 IMP5 IMP6 IMP7

HORIZONTAL SPACING, U.N.O.

A = 1' - 0" WIDE
B = 2' - 0" WIDE
C = 3' - 0" WIDE
D = 1' - 6" WIDE
E = 2' - 6" WIDE
F = 3' - 6" WIDE

IMP4: 1' - 0" WIDE, TYPICAL

NOTES

1. REFER TO SHEET G0.11 FOR TYPICAL SYMBOLS AND ABBREVIATIONS
2. CONTRACTOR TO VERIFY INSULATED METAL PANEL SIZES AT END AND CORNER CONDITIONS
3. REFER TO STRUCTURAL EXTERIOR STUD ELEVATIONS FOR LOCATION OF DRIFT JOINT AND VERTICAL JOINT WHERE OCCURS.

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SHEET NAME:

EXTERIOR INSULATED METAL PANEL ELEVATIONS

ADDENDUM #2

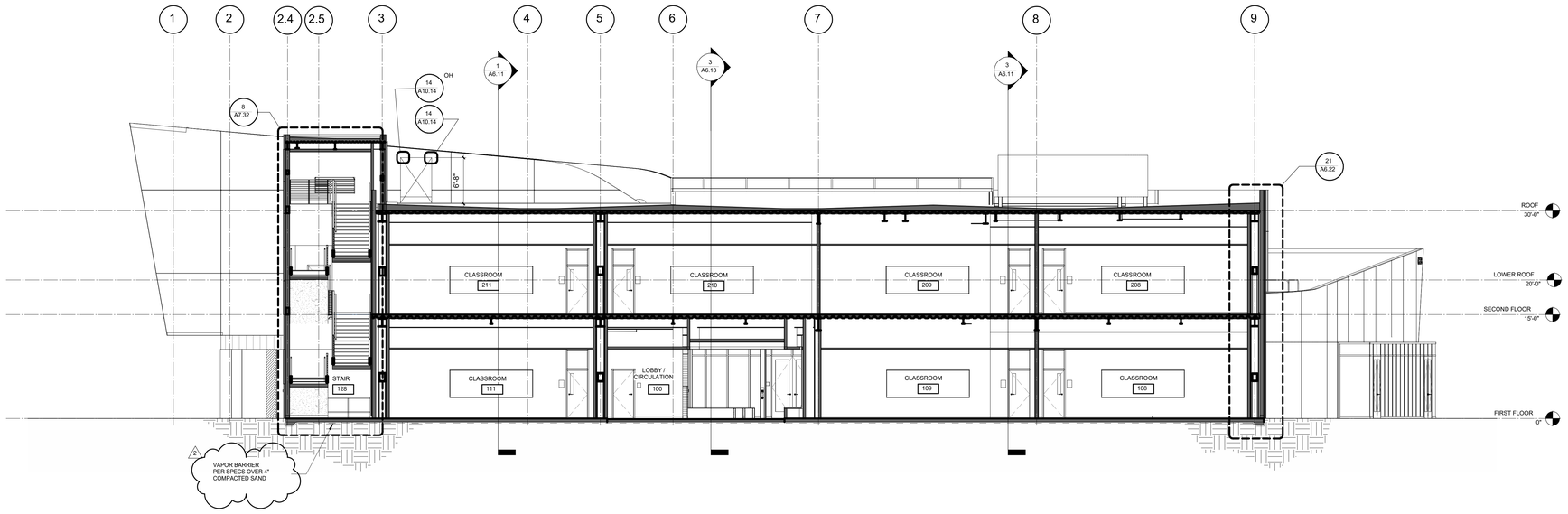
FILE NO.: **36-C1** A# : **04-119722**

DATE: **08.05.2021** CLIENT PROJ NO:

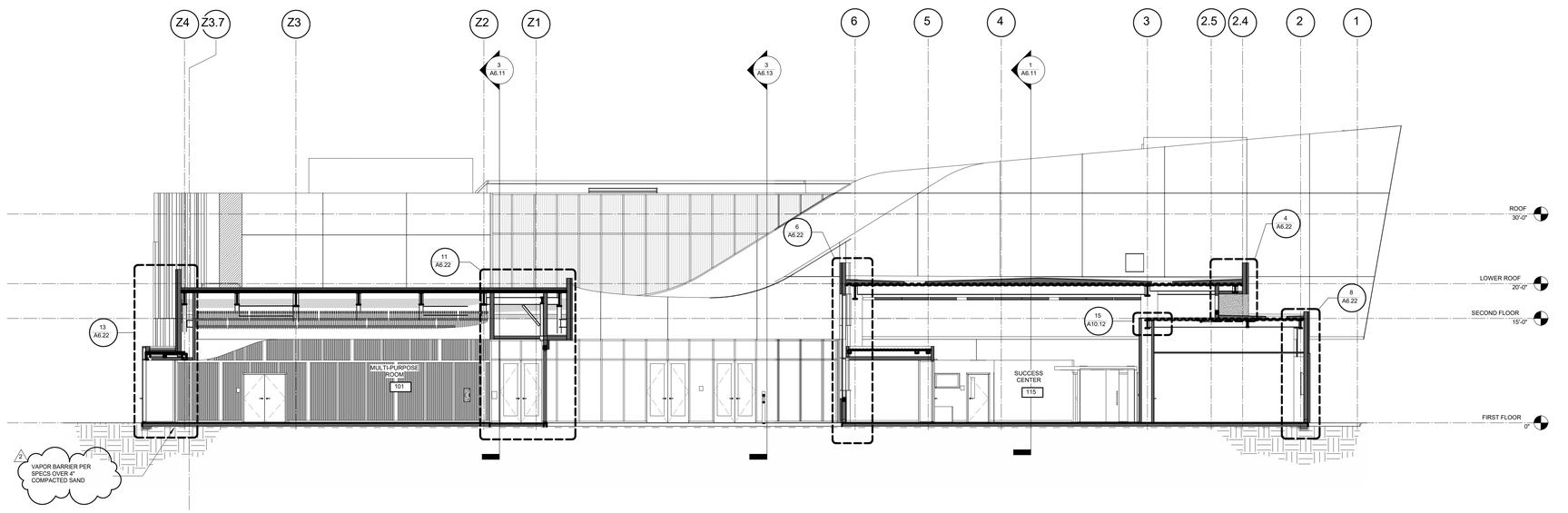
SHEET:

A5.22

EXISTING CONDITIONS SHOWN ARE BASED ON AS-BUILT DRAWINGS AND SITE OBSERVATIONS. ACTUAL CONDITIONS MAY VARY.



BUILDING SECTION 3 — 1/8" = 1'-0"



BUILDING SECTION 1 — 1/8" = 1'-0"

2/9/2022 1:59:10 PM

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ISSUE

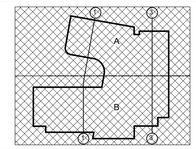
Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

LEGENDS

NOTES

KEY PLAN:



FACILITY:

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

BUILDING SECTIONS

ADDENDUM #2

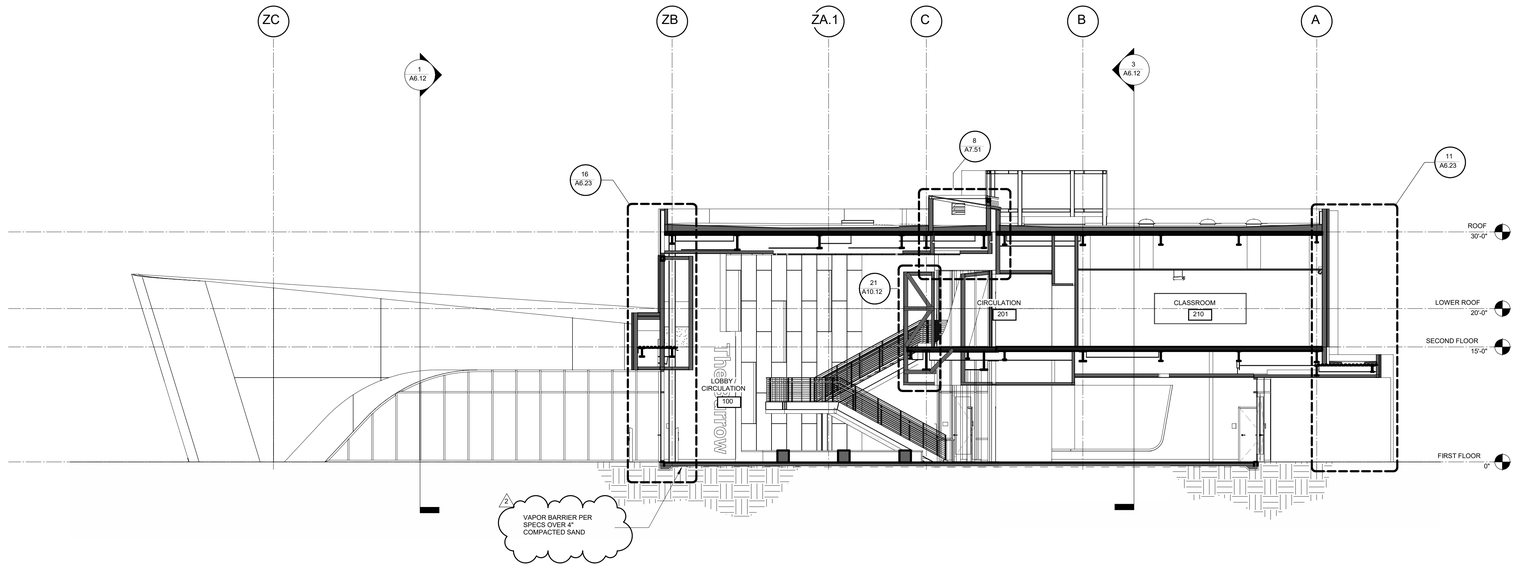
FILE NO.: 36-C1 | **A# : 04-119722**

DATE: **08.05.2021** | CLIENT PROJ NO:

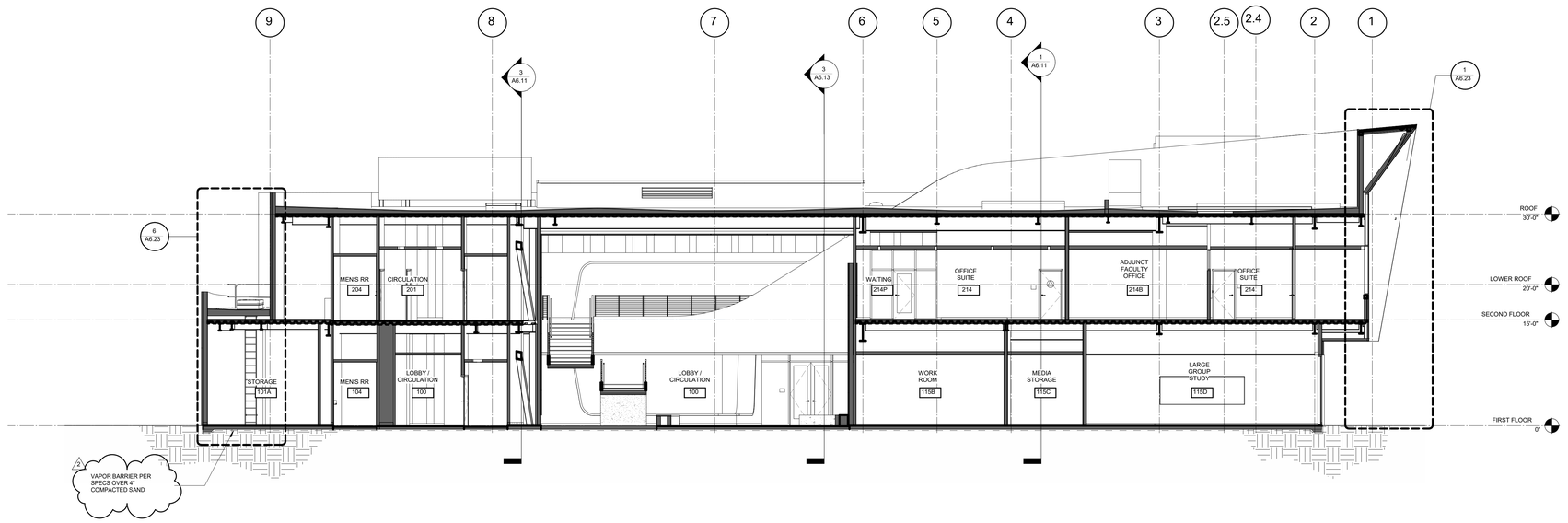
SHEET:

A6.12

DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY. CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB. ANY DISCREPANCIES SHALL BE REPORTED TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.



BUILDING SECTION — **3** — 1/8" = 1'-0"



BUILDING SECTION — **1** — 1/8" = 1'-0"

2/9/2022 1:58:33 PM

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LICENSED ARCHITECT — KENNETH SALYER — NO. C-19082 — REN. 11-30-22 — STATE OF CALIFORNIA

ISSUE

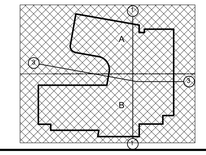
Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

LEGENDS

NOTES

KEY PLAN:



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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

BUILDING SECTIONS

ADDENDUM #2

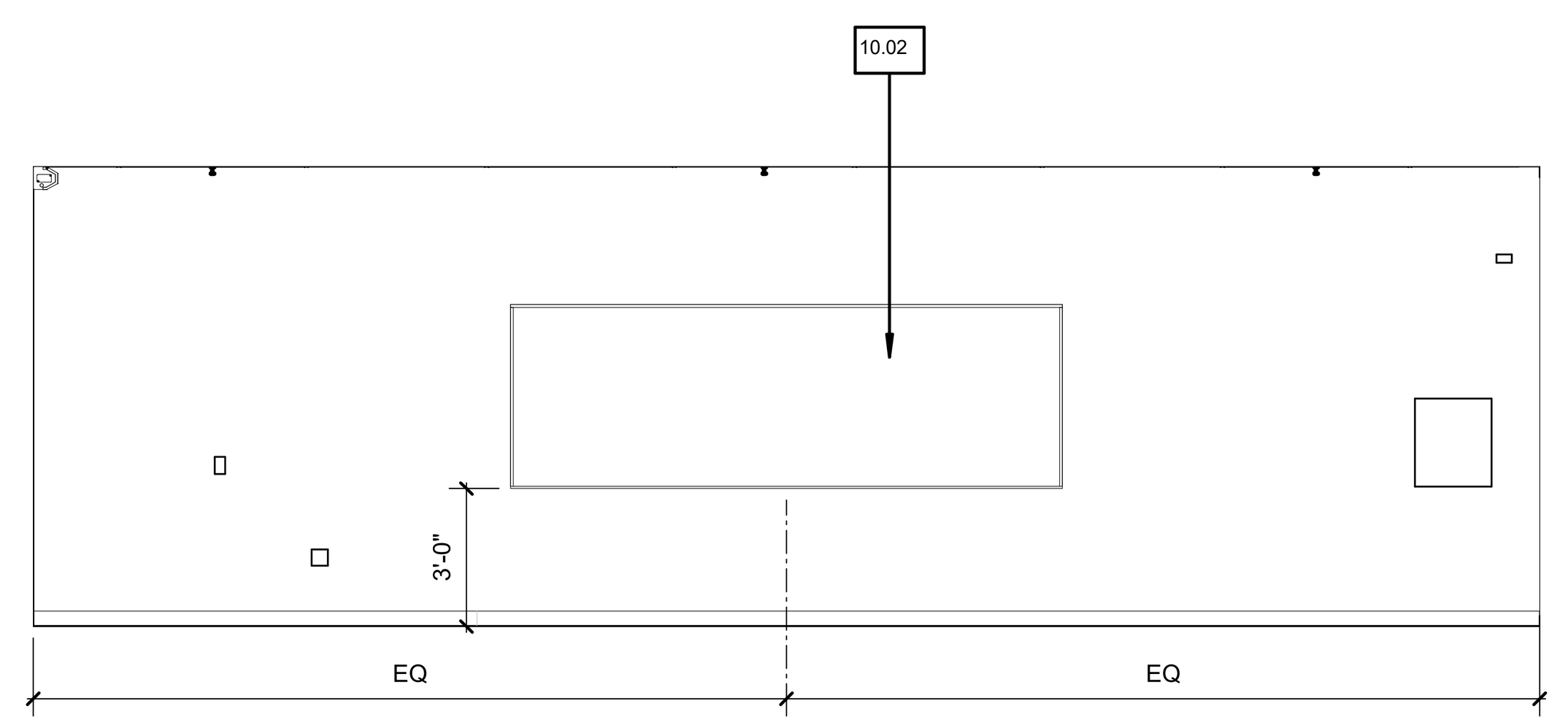
FILE NO.: **36-C1** — A# : **04-119722**

DATE: **08.05.2021** — CLIENT PROJ NO:

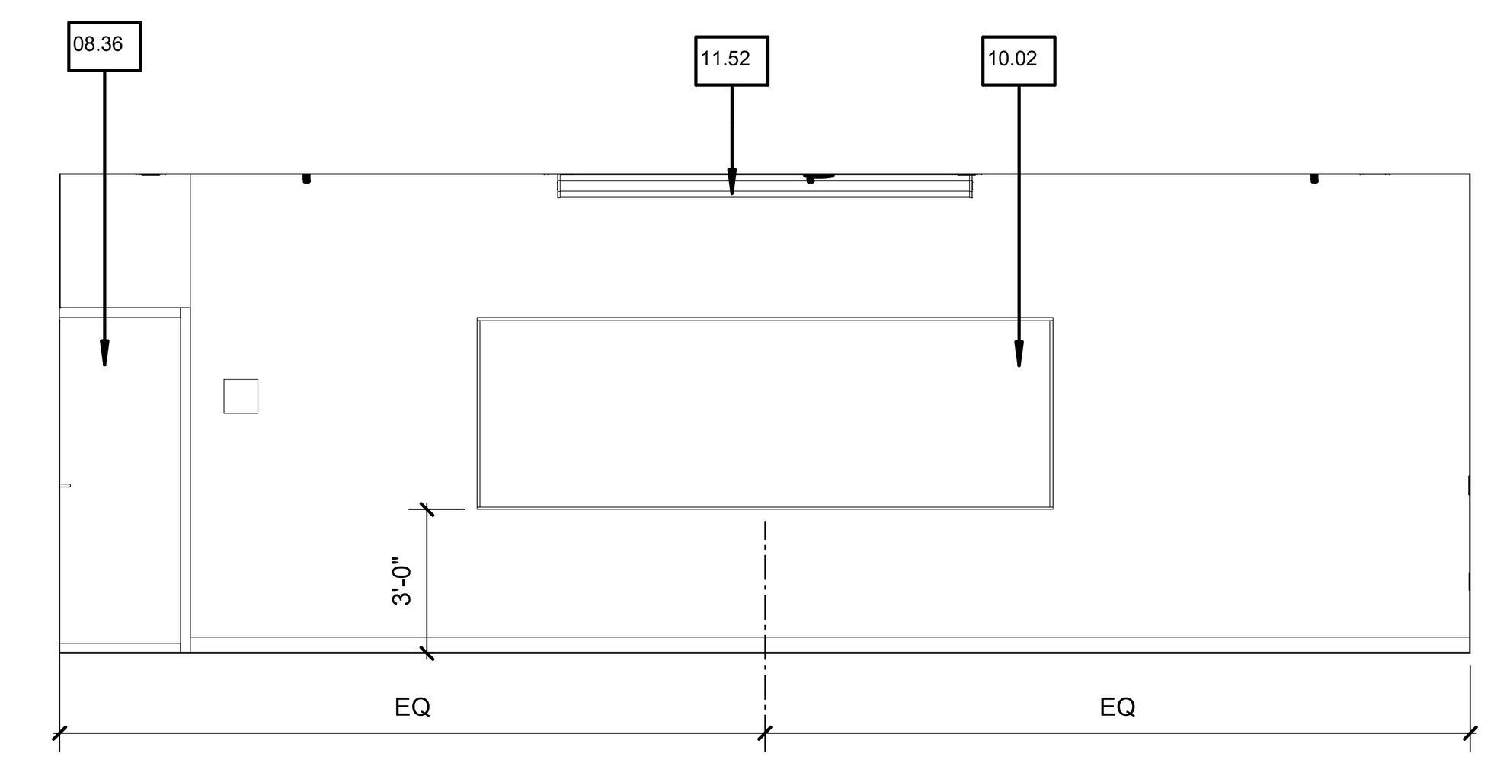
SHEET:

A6.13

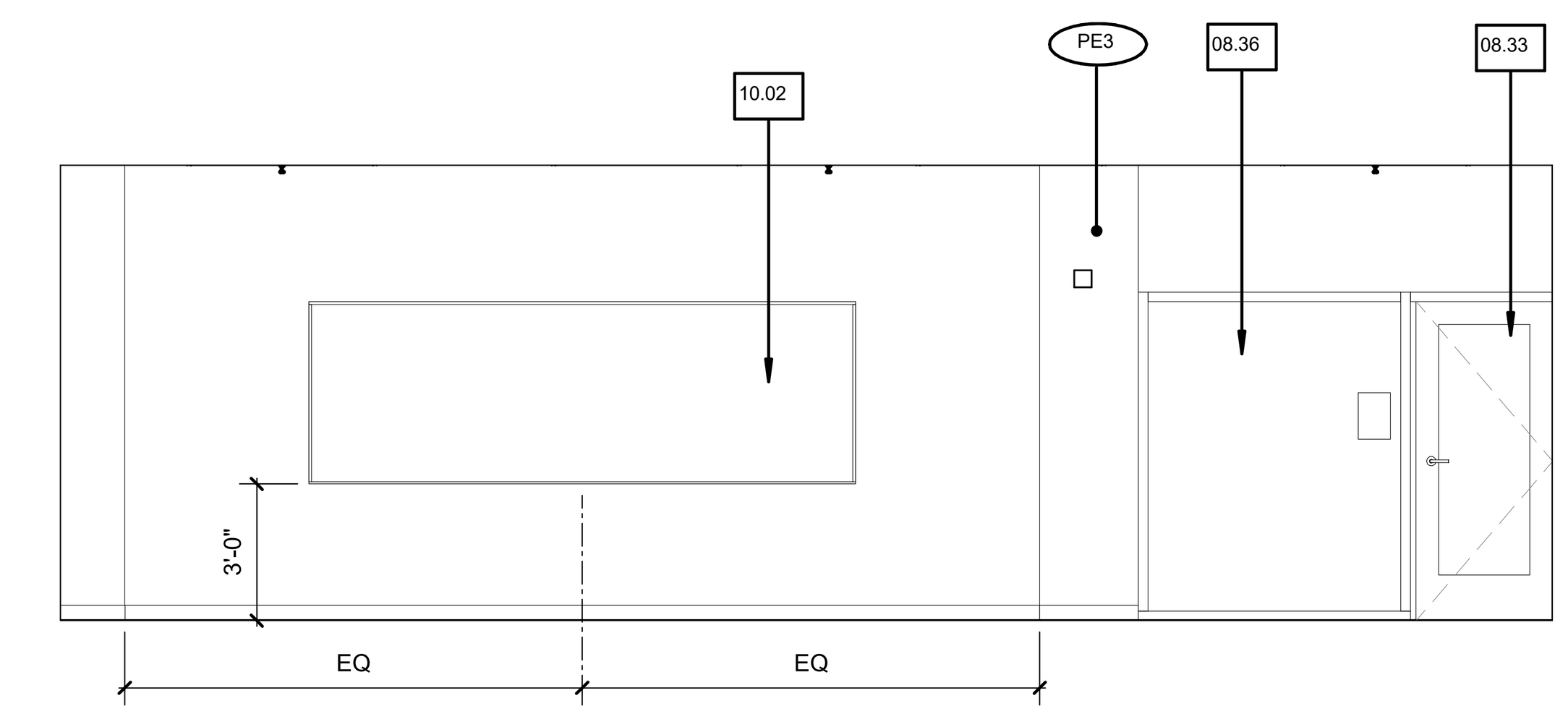
PLEASE RECYCLE



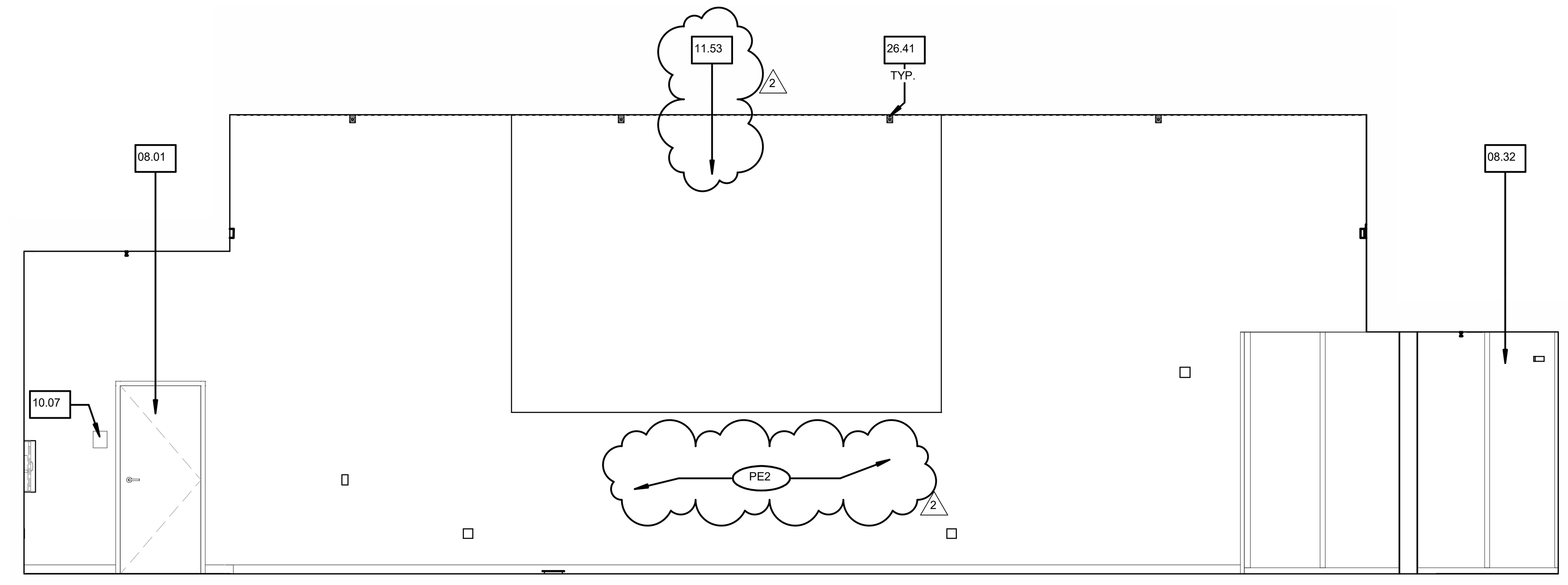
ROOM 115D - LARGE GROUP STUDY - EAST ELEVATION 19
1/4" = 1'-0"



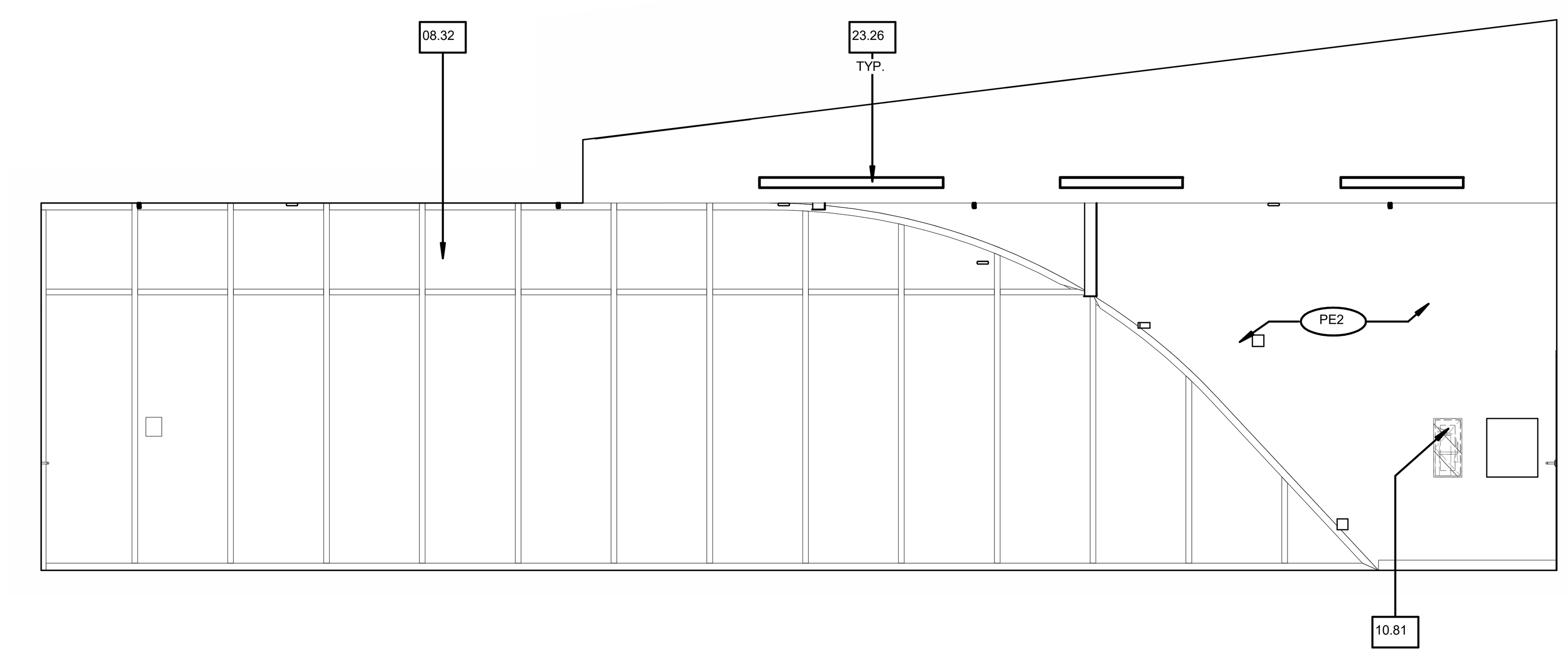
ROOM 115D - LARGE GROUP STUDY - NORTH ELEVATION 10
1/4" = 1'-0"



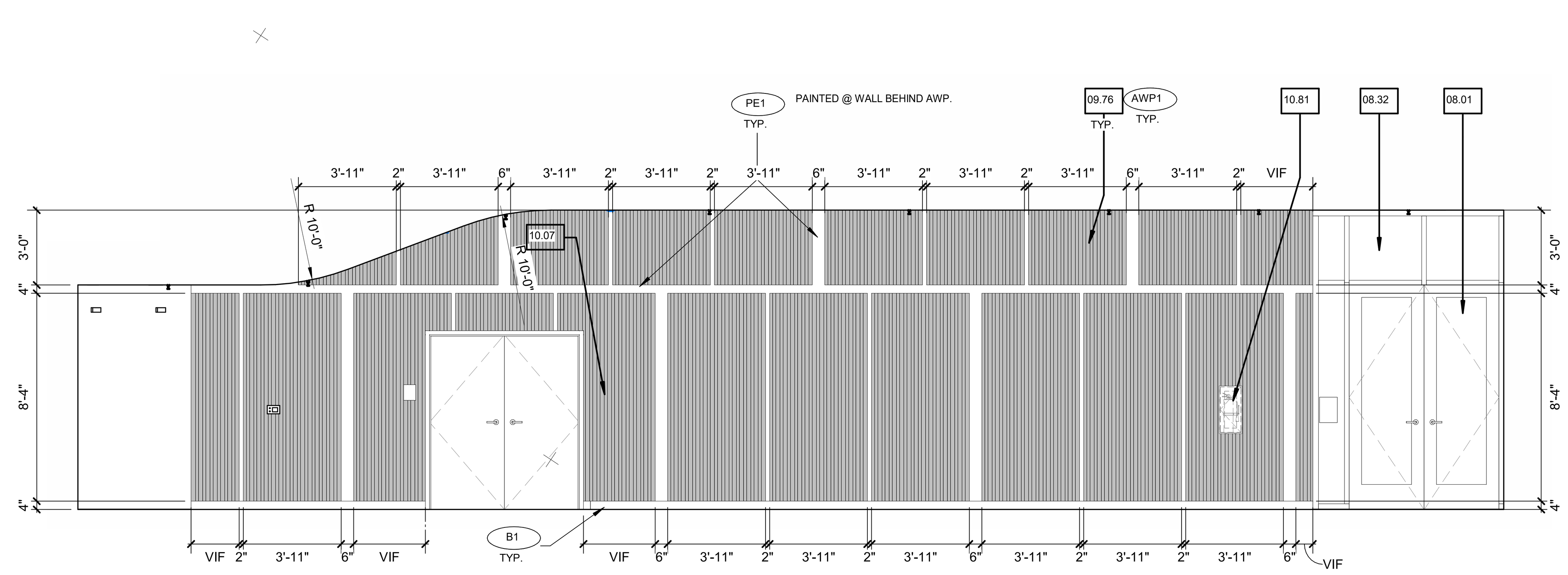
ROOM 115D - LARGE GROUP STUDY - WEST ELEVATION 5
1/4" = 1'-0"



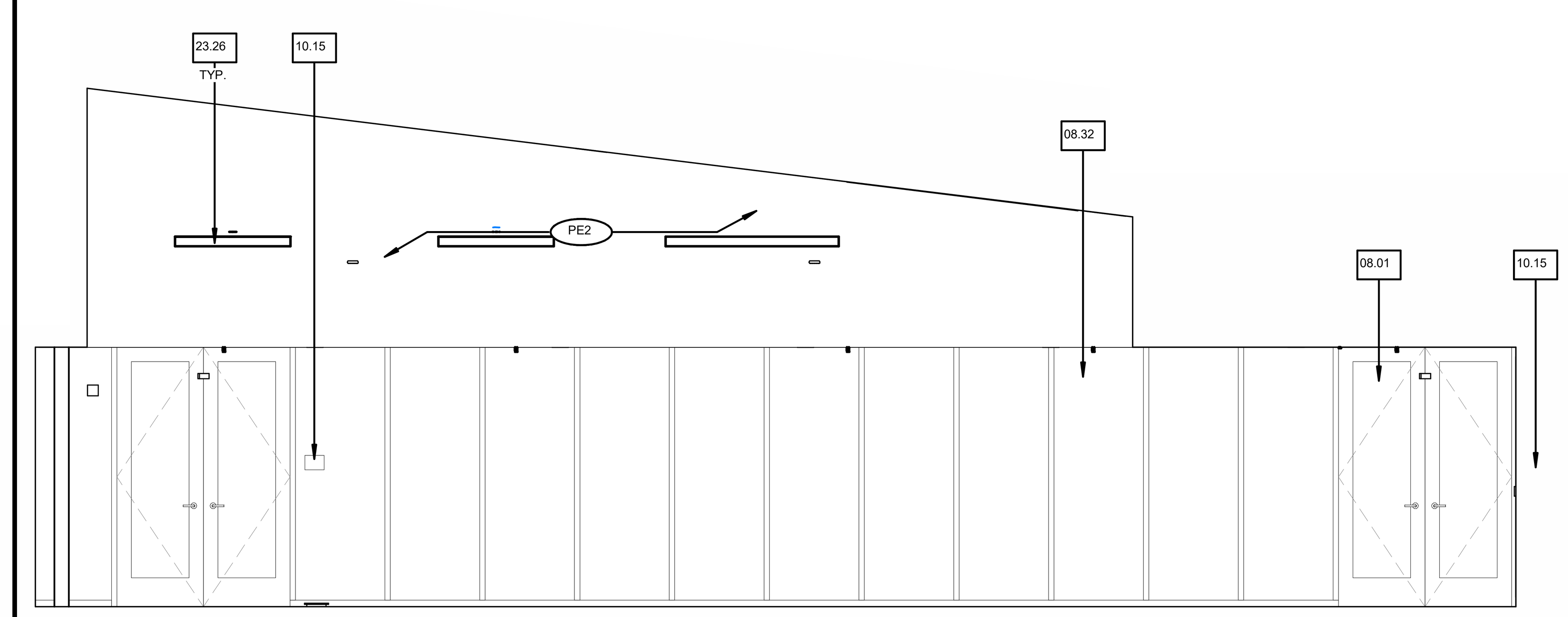
ROOM 101 - MULTI-PURPOSE ROOM - WEST 13
1/4" = 1'-0"



ROOM 101 - MULTI-PURPOSE ROOM - SOUTH 3
1/4" = 1'-0"



ROOM 101 - MULTI-PURPOSE ROOM - EAST 11
1/4" = 1'-0"



ROOM 101 - MULTI-PURPOSE ROOM - NORTH 1
1/4" = 1'-0"

AGENCY APPROVAL:

Chaffey College

HMC Architects
5009006-000
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ONTARIO, CA 91764
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LICENSED ARCHITECT KENNETH SALYER NO. C-19062 REN. 11-30-23 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

08.01	DOOR | DOOR SCHEDULE
08.32	EXT STOREFRONT/ CURTAINWALL | WINDOW SCHEDULE
08.33	ALUMINUM DOOR | DOOR SCHEDULE
08.36	DEMOUNTABLE PARTITION | WINDOW SCHEDULE
09.76	ACOUSTICAL WALL PANEL
10.02	WHITE BOARD | 3/A10.91
10.07	ROOM ID SIGN - SINGLE INSERT | 15/A10.82
10.15	TACTILE "EXIT" SIGN | 1B/A10.82
10.81	RECESSED FIRE EXTINGUISHER CABINET | 1/A10.91
11.52	PROJECTION SCREEN (OFOI) | 23/A10.32 | REFER TO AV
11.53	PROJECTION SCREEN (CFCI) | 23/A10.32 | REFER TO AV
23.26	MECHANICAL REGISTERS | MECHANICAL
26.41	LIGHT FIXTURE | ELECTRICAL

NOTES

1. LIGHT FIXTURES, AIR TERMINALS, GRILLES, ELECTRICAL FIXTURES, OUTLETS, DATA RECEPTACLES, AUDIO/VIDEO CONNECTIONS AND MEDICAL GAS FIXTURES SHOWN ARE FOR ARCHITECTURAL COORDINATION AND DIMENSIONAL CONTROL ONLY. REF: MECHANICAL, ELECTRICAL, AND PLUMBING DRAWINGS AND SPECIFICATIONS.
2. NOT ALL FIXTURES MAY BE SHOWN ON ARCHITECTURAL ELEVATIONS
3. REFER TO SHEET G0.11 FOR TYPICAL SYMBOLS AND ABBREVIATIONS
4. REFER TO SHEET A9.31 FOR FINISH ABBREVIATIONS & DETAILS.
5. MECHANICAL REGISTERS IN WALLS PAINTED OTHER THAN PE1, SHALL BE FACTORY FINISHED TO MATCH ADJACENT WALL COLOR

FACILITY:
CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
INTERIOR ELEVATIONS - FIRST FLOOR

ADDENDUM #2

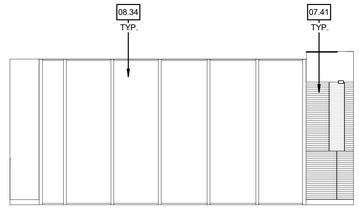
FILE NO.: 36-C1 | A#: 04-119722
DATE: 08.05.2021 | CLIENT PROJ NO:
SHEET:

A8.11

2/8/2022 1:14:58 PM

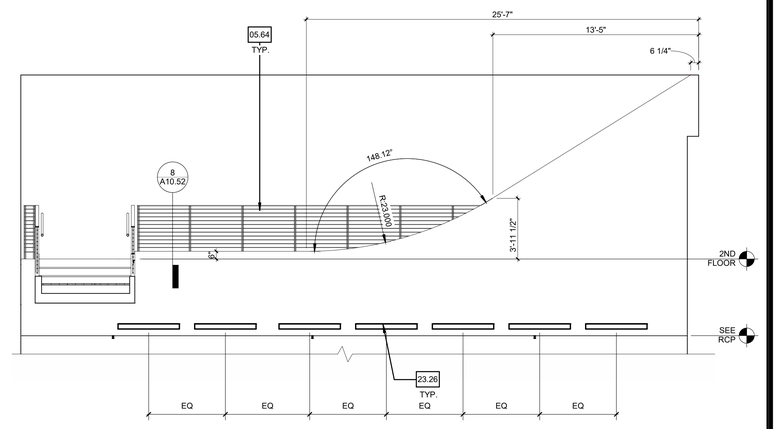
PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL SPACE SIZE

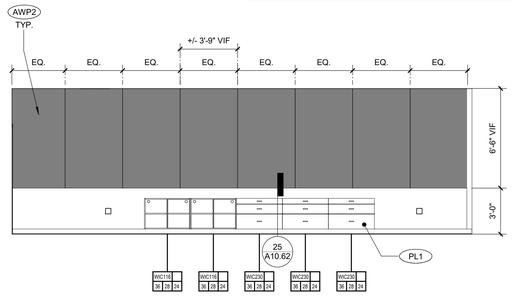


SEE 17 / A8.31 FOR ADDITIONAL INSULATED METAL PANEL INFORMATION.

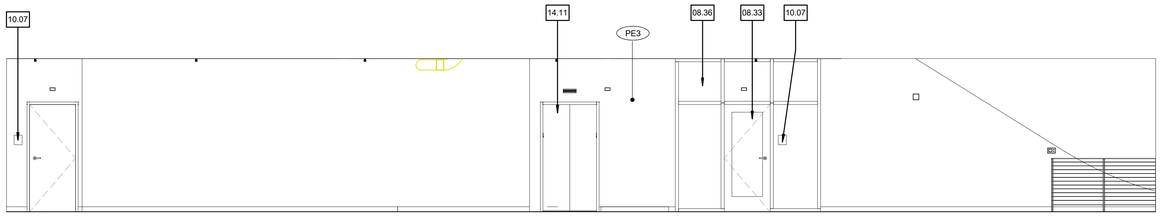
ROOM 214N - LARGE CONFERENCE ROOM - NORTH ELEVATION | 19
1/4" = 1'-0"



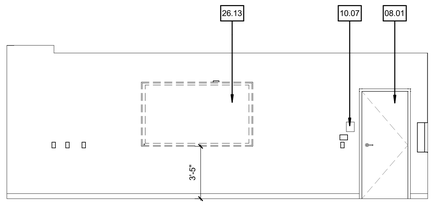
ROOM 100 - LOBBY/CIRCULATION - EAST ELEVATION @ SECOND FLOOR | 4
1/4" = 1'-0"



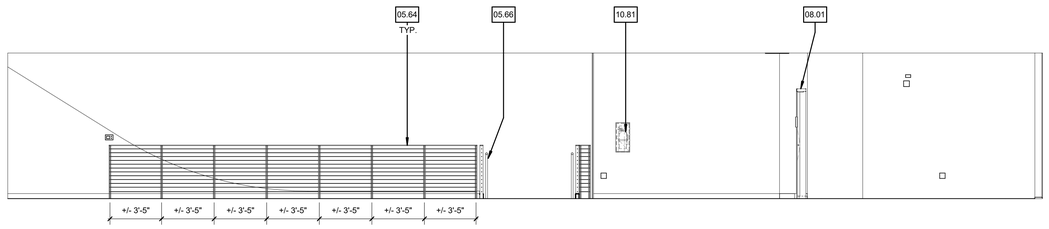
ROOM 214N - LARGE CONFERENCE ROOM - WEST ELEVATION | 18
1/4" = 1'-0"



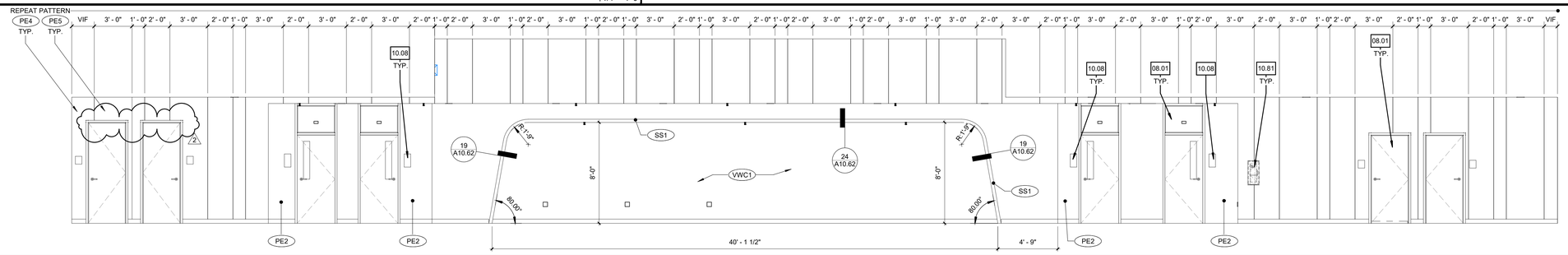
ROOM 201 - CIRCULATION - WEST ELEVATION B | 3
1/4" = 1'-0"



ROOM 214N - LARGE CONFERENCE ROOM - SOUTH ELEVATION | 17
1/4" = 1'-0"



ROOM 201 - CIRCULATION - WEST ELEVATION A | 2
1/4" = 1'-0"



ROOM 201 - CIRCULATION - EAST ELEVATION | 1
NTS

2/10/2022 9:48:21 AM

PLEASE RECYCLE

AGENCY APPROVAL:

Chaffey College

HMC Architects

5009006-000

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909 989 9979 / www.hmcarchitects.com

LICENSED ARCHITECT
KENNETH SALYER
NO. C-19082
REN. 11-30-22
STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

05.64	METAL GUARD
05.66	METAL HANDRAIL
07.41	INSULATED METAL WALL PANELS | 1/A10.15, 3/A10.15
08.01	DOOR | DOOR SCHEDULE
08.33	ALUMINUM DOOR | DOOR SCHEDULE
08.34	GLAZED ALUMINUM CURTAIN WALL
08.36	DEMOUNTABLE PARTITION | WINDOW SCHEDULE
10.07	ROOM ID SIGN - SINGLE INSERT | 15/A10.82
10.08	ROOM ID SIGN - DOUBLE INSERT | 14/A10.82
10.81	RECESSED FIRE EXTINGUISHER CABINET | 1/A10.91
14.11	ELEVATOR ENTRANCE
23.26	MECHANICAL REGISTERS | MECHANICAL
26.13	INSTALL BACKING PER DETAIL 1/XS0.61 FOR TV (OFOI) | ELECTRICAL

NOTES

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3. REFER TO SHEET G0.11 FOR TYPICAL SYMBOLS AND ABBREVIATIONS
4. REFER TO SHEET A9.31 FOR FINISH ABBREVIATIONS & DETAILS.
5. MECHANICAL REGISTERS IN WALLS PAINTED OTHER THAN PE1, SHALL BE FACTORY FINISHED TO MATCH ADJACENT WALL COLOR

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

INTERIOR ELEVATIONS - SECOND FLOOR

ADDENDUM #2

FILE NO.: 36-C1 | **A# : 04-119722**

DATE: **08.05.2021** | CLIENT PROJ NO:

SHEET:

A8.21

IF THE LINE SHOWN ABOVE IS NOT 1" LONG, THIS SHEET IS ORIGINAL PAPER SIZE

GENERAL NOTES

1. THE PURPOSE OF THIS SHEET IS TO DESCRIBE AND ILLUSTRATE DOOR TYPES. NOT ALL DOOR TYPES SHOWN ARE NECESSARILY USED. SEE DOOR SCHEDULE FOR DOOR TYPES USED.

2. FIRE DOORS, FIRE WINDOWS AND FIRE DAMPERS SHALL HAVE AN APPROVED LABEL OR LISTING MARK, INDICATING THE FIRE PROTECTION RATING WHICH IS PERMANENTLY AFFIXED AT THE FACTORY WHERE FABRICATION AND ASSEMBLY ARE DONE.

3. GLASS:
   A. INTERIOR DOORS:
      1. NON-RATED DOORS SHALL HAVE 1/4" CLEAR TEMPERED GLASS MIN, UNO.
      2. ALL RATED DOORS SHALL HAVE 1/4" CLEAR FIRE RATED GLASS MIN, UNO.
   B. MAXIMUM GLASS IN FIRE RATED DOORS:
      1. 20 MINUTE DOORS: 1296 SQUARE INCHES MAXIMUM.
      2. 60 MINUTE DOORS: 100 SQUARE INCHES MAXIMUM.
      3. 90 MINUTE DOORS: 100 SQUARE INCHES MAXIMUM PER LITE.

4. GLAZING IN THE FOLLOWING LISTED AREAS SHALL BE DEEMED TO BE LOCATED IN HAZARDOUS LOCATIONS AND SUBJECT TO HUMAN IMPACT, AND AS SUCH SHALL BE REQUIRED TO BE COMPOSED OF SAFETY GLAZING:
   A. INGRESS AND EGRESS DOORS.
   B. FIXED PANELS IN SWINGING DOORS.
   C. GLAZING IN FIXED PANELS ADJACENT TO A DOOR WHERE THE NEAREST EXPOSED EDGE OF THE GLAZING IS WITHIN A 24 INCH ARC OF EITHER VERTICAL EDGE OF THE DOOR ON A CLOSED POSITION AND WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 60 INCHES ABOVE THE WALKING SURFACE.
   D. GLAZING IN INDIVIDUAL FIXED PANELS WHERE:
      1. THE EXPOSED AREA OF THE INDIVIDUAL PANE EXCEEDS 9 SQUARE FEET.
      2. THE EXPOSED BOTTOM EDGE IS LESS THAN 18 INCHES ABOVE THE FLOOR.
      3. THE EXPOSED TOP EDGE IS GREATER THAN 36 INCHES ABOVE THE FLOOR.
      4. ONE OR MORE WALKING SURFACES WITHIN 36 INCHES HORIZONTALLY OF THE PLANE OF THE GLAZING.

5. EACH LIGHT OF THE GLAZING SHALL BEAR THE MANUFACTURER'S LABEL DESIGNATING THE TYPE AND THICKNESS OF GLASS. WHEN APPROVED BY THE AGENCY, LABELS MAY BE OMITTED FROM OTHER THAN SAFETY GLAZING MATERIALS, PROVIDED AN AFFIDAVIT IS FURNISHED BY THE GLAZING CONTRACTOR CERTIFYING THAT EACH LIGHT IS GLAZED IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATIONS. IDENTIFICATION OF GLAZING IN HAZARDOUS LOCATIONS AND SUBJECT TO HUMAN IMPACT SHALL BE ETCHED OR CERAMIC FIRED ON THE GLASS AND READABLE FROM THE INSIDE OF THE BUILDING AFTER INSTALLATIONS.

6. EXIT DOORS SHALL BE OPENABLE FROM THE INSIDE WITHOUT THE USE OF A KEY OR ANY SPECIAL KNOWLEDGE OR EFFORT.

7. PANIC HARDWARE SHALL COMPLY WITH THE REQUIREMENTS OF UBC STANDARD 10-4. THE ACTIVATING MEMBER SHALL BE MOUNTED AT A HEIGHT OF NOT LESS THAN 36 INCHES NOR MORE THAN 44 INCHES ABOVE THE FLOOR. THE UNLATCHING FORCE SHALL NOT EXCEED 15 POUNDS WHEN APPLIED IN THE DIRECTION OF TRAVEL.

8. DOOR ASSEMBLIES, APPROACHES AND FINISH HARDWARE SHALL BE IN COMPLIANCE WITH DISABLED ACCESS CONSTRUCTION STANDARDS.

9. THE MAXIMUM EFFORT TO OPERATE DOORS SHALL NOT EXCEED THE FOLLOWING:
   A. EXTERIOR DOORS = 5.0 POUNDS
   B. INTERIOR DOORS = 5.0 POUNDS
   C. FIRE DOORS = 15.0 POUNDS

10. DOOR OPENING LOCATIONS:
    A. IMMEDIATELY 6" FROM F.O.S. ADJACENT TO A FLANKING WALL U.N.O.
    B. DOOR OPENINGS IN OTHER LOCATIONS ARE LOCATED BY DIMENSIONS.

11. SEE SPECIFICATIONS FOR HARDWARE SCHEDULE

12. ALL DOOR FRAMES ARE WELDED FRAMES, UNLESS NOTED OTHERWISE
    FRAME DEPTH TO BE DETERMINED BY OVERALL WALL THICKNESS

13. FINISH FLOOR TRANSITIONS OCCUR AT CENTERLINE OF DOORS, UNLESS NOTED OTHERWISE

14. ALL INTERIOR DOORS WITH FIRE-RATINGS GREATER THAN 20 MINUTE SHALL HAVE A NONCOMBUSTIBLE SILL WITH AN UNDERCUT OF 3/8" MAXIMUM ABOVE THE SILL.

15. MIN. 32" CLEAR WIDTH: AT LEAST ONE ACTIVE LEAF TO MEET 32" CLEAR WIDTH.

16. THE BOTTOM 10 INCHES OF ALL DOORS AND GATES TO HAVE SMOOTH UNINTERRUPTED SURFACE TO ALLOW THE DOOR TO BE OPENED BY A WHEELCHAIR FOOTREST WITHOUT CREATING A TRAP OR HAZARDOUS CONDITION (CBC. 11B-404.2.1.0).

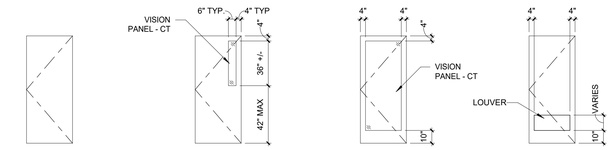
17. DOOR THRESHOLD NOT TO EXCEED 1/2" WITH BEVELED SLOPE NOT MORE THAN 2:1 FOR THE UPPER 1/4" (CBC. 11B-303.3).

18. EACH LIGHT OF SAFETY GLAZING MATERIAL IN HAZARDOUS LOCATIONS AS DEFINED IN SECTION 2406 OF CHAPTER 24, "GLASS AND GLAZING," SHALL BE IDENTIFIED BY A LABEL WHICH WILL SPECIFY THE LABELER, WHETHER THE MANUFACTURER OR INSTALLER, AND STATE THAT SAFETY GLAZING MATERIAL HAS BEEN UTILIZED IN SUCH INSTALLATIONS. THE LABEL SHALL BE LEGIBLE AND VISIBLE FROM THE INSIDE OF THE BUILDING AFTER INSTALLATION AND SHALL SPECIFY THAT THE LABEL SHALL NOT BE REMOVED.

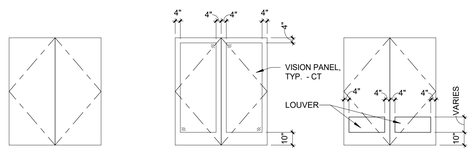
19. EACH PANE SHALL BEAR THE MANUFACTURER'S MARK DESIGNATING THE TYPE AND THICKNESS OF THE GLASS OR GLAZING MATERIAL. SAFETY GLAZING SHALL BE IDENTIFIED IN ACCORDANCE WITH CBC SECTION 2406.3. EACH PANE OF TEMPERED GLASS, EXCEPT TEMPERED SPANDREL GLASS, SHALL BE PERMANENTLY IDENTIFIED BY THE MANUFACTURER. THE IDENTIFICATION MARK SHALL BE ACID ETCHED, SAND BLASTED, CERAMIC FIRED, LASER ETCHED, EMBOSSED OR OF A TYPE THAT, ONCE APPLIED CANNOT BE REMOVED WITHOUT BEING DESTROYED. TEMPERED SPANDREL GLASS SHALL BE PROVIDED WITH A REMOVABLE PAPER MARKING BY THE MANUFACTURER.

DOOR TYPE LEGEND

PNL-F- XX-
- DOOR PANEL TYPE - SEE BELOW
- DOOR PANEL MATERIAL /FINISH - SEE LEGEND



PNL-F PNL-N PNL-FG PNL-L



PNL-F PNL-FG PNL-L

DOOR FRAME LEGEND

FRM-##XX-
- DOOR FRAME TYPE - SEE BELOW
- DOOR FRAME MATERIAL / FINISH - SEE LEGEND

FRM-00HM FRM-00HM FRM-10HM FRM-00AL

FRM-50AL

DOOR SCHEDULE

DOOR NUMBER	SIZE WIDTH PANEL 1	SIZE WIDTH PANEL 2	SIZE HEIGHT	DOOR TYPE	FRAME TYPE	FIRE RATING (MINUTES)	HARDWARE GROUP	PANIC HARDWARE	UNDERCUT	DETAIL HEAD	DETAIL JAMB	DETAIL SILL	COMMENTS
FIRST FLOOR													
100-A	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	13	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL & AUTOMATIC DOOR OPERATORS
100-B	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	14	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
100-C	3'-0"		9'-0"	PNL-FG-AL	FRM-00AL	0	01	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
100-D	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	13B	No	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
100-E	3'-0"		9'-0"	PNL-FG-AL	FRM-00AL	0	01	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
100A-A	3'-0"		7'-0"	PNL-F-HM	FRM-00HM	0	04B	No	0"	4/A10.21	4/A10.21	7/A10.21	
101-A	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	15	No	0"	13/A10.22	7/A10.22	7/A10.21	ACCESS CONTROL, ADG-1
101-B	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	14	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
101-C	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	14	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
101A-A	3'-0"	3'-0"	7'-0"	PNL-F-HM	FRM-00HM	0	16	No	0"	4/A10.21	4/A10.21	7/A10.21	
101B-A	3'-0"		7'-0"	PNL-F-HM	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
102-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	11	No	3/4"	5/A10.21	5/A10.21	7/A10.21	
103-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	12	No	0"	5/A10.21	5/A10.21	7/A10.21	AUTOMATIC DOOR OPERATORS
104-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	12	No	0"	5/A10.21	5/A10.21	7/A10.21	AUTOMATIC DOOR OPERATORS
105-A	3'-0"		7'-0"	PNL-F-HM	FRM-00HM	0	03	No	0"	3/A10.21	3/A10.21	1/A10.21	
106-A	4'-0"		8'-0"	PNL-F-HM	FRM-00HM	0	03A	No	0"	3/A10.21	3/A10.21	1/A10.21	
107-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
108-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
109-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
111-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
112-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
113-A	3'-0"	3'-0"	7'-0"	PNL-F-WD	FRM-00HM	0	16	No	0"	4/A10.21	4/A10.21	7/A10.21	
114-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	45	10	No	0"	4/A10.21	4/A10.21	6/A10.21	
115-A	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	13A	No	0"	13/A10.22	7/A10.22	7/A10.21	ACCESS CONTROL, AUTOMATIC DOOR OPERATORS, ADG-1
115-B	3'-0"		9'-0"	PNL-FG-AL	FRM-00AL	0	02	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
115B-A	3'-0"		7'-0"	PNL-N-WD	FRM-00HM	0	06A	No	0"	4/A10.21	4/A10.21	7/A10.21	ADG-1
115C-A	3'-0"		7'-0"	PNL-N-WD	FRM-00HM	0	04A	No	0"	4/A10.21	4/A10.21	7/A10.21	ADG-1
115D-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115E-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115G-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115H-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115K-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115L-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115N-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115Q-A	3'-0"		9'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
115R-A	3'-0"		9'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	

DOOR SCHEDULE

DOOR NUMBER	SIZE WIDTH PANEL 1	SIZE WIDTH PANEL 2	SIZE HEIGHT	DOOR TYPE	FRAME TYPE	FIRE RATING (MINUTES)	HARDWARE GROUP	PANIC HARDWARE	UNDERCUT	DETAIL HEAD	DETAIL JAMB	DETAIL SILL	COMMENTS
SECOND FLOOR													
202-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	11	No	3/4"	5/A10.21	5/A10.21	7/A10.21	
203-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	12	No	0"	5/A10.21	5/A10.21	7/A10.21	AUTOMATIC DOOR OPERATORS
204-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	12	No	0"	5/A10.21	5/A10.21	7/A10.21	AUTOMATIC DOOR OPERATORS
205-A	3'-0"	2	7'-0"	PNL-F-WD	FRM-00HM	0	11A	No	0"	5/A10.21	5/A10.21	7/A10.21	ADG-1
206-A	3'-0"		8'-0"	PNL-F-WD	FRM-00HM	45	10	No	0"	4/A10.21	4/A10.21	6/A10.21	
207-A	3'-0"		8'-0"	PNL-F-WD	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
208-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	4/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
209-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
210-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
211-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
212-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
213-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
214-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	18	Yes	0"	17/A10.26	19/A10.26	16/A10.26	ACCESS CONTROL
214-B	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	09	Yes	0"	4/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL
214A-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	11	No	3/4"	5/A10.21	5/A10.21	7/A10.21	
214B-A	3'-0"		7'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	17/A10.26	19/A10.26	11/A10.26	
214C-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214D-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214E-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214F-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214G-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214H-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214J-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214K-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214L-A	3'-0"		7'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	17/A10.26	19/A10.26	11/A10.26	
214M-A	3'-0"		7'-0"	PNL-N-WD	FRM-00HM	0	07	No	0"	4/A10.21	4/A10.21	7/A10.21	
214M-B	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	06	No	0"	4/A10.21	4/A10.21	7/A10.21	ADG-1
214N-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	19	Yes	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
214N-B	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	19	Yes	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1

DOOR SCHEDULE

DOOR NUMBER	SIZE WIDTH PANEL 1	SIZE WIDTH PANEL 2	SIZE HEIGHT	DOOR TYPE	FRAME TYPE	FIRE RATING (MINUTES)	HARDWARE GROUP	PANIC HARDWARE	UNDERCUT	DETAIL HEAD	DETAIL JAMB	DETAIL SILL	COMMENTS
ROOF													
300-A	3'-0"		7'-0"	PNL-F-HM	FRM-00HM	0	03	No	0"	3/A10.21	3/A10.21	1/A10.21 SIM.	

GATE SCHEDULE

NUMBER	SIZE WIDTH PANEL 1	SIZE WIDTH PANEL 2	SIZE HEIGHT	DOOR MATERIAL	FIRE RATING (MINUTES)	HARDWARE GROUP	PANIC HARDWARE	COMMENTS
G-001	7'-0"	7'-0"	8'-0"	SEE ELEVATION, 3/A7.61	0	21	No	

DOOR MATERIAL/FINISH LEGEND

A	ALARM CONTACT
AL	ALUMINUM
ADG-1	ACOUSTIC DOOR GASKET
AO	AUTOMATIC DOOR OPERATOR
CA	CLEAR ANODIZED
CL	COMBO LOCK
CR	CARD READER
CT	CLEAR TEMPERED GLAZING
CW	CURTAIN WALL
DE	DOUBLE EGRESS
EB	"PUSH TO EXIT" EMERGENCY BUTTON
EL	ELECTRICAL LOCK
ET	ENTRY TELEPHONE
FF	FACTORY FINISHED
FRG	FIRE RATED GLASS
FRG/	FIRE RATED GLASS & FRAMING
GL	GLASS
HB	HELP BUTTON
HM	HOLLOW METAL
IC	INTERCOM
IG	INSULATING GLASS
IP	INFILL PANEL
KD	KNOCK DOWN FRAME
LA	LOCAL ALARM
M	MONITOR
MG	MIRROR GLASS
MHO	MAGNETIC HOLD OPEN
NR	NOT RATED
PB	PANIC BAR
PL	PRIVACY LOCK
PL#	PLASTIC LAMINATE
PP	PUSH PLATE (# OF PLATES)
PT	PAINT (FACTORY FINISH ALL WOOD DOORS TYPICAL, FIELD PAINT H.M. DOOR AND FRAME
REX	REQUEST TO EXIT MOTION SENSOR
RF	RF COPPER SHIELDED NON-FERROUS SYSTEM
S	STAIN GRADE WOOD VENEER
SC	SOLID CORE
SG	SAFETY GLASS
SHD	SHIELDED DOOR FRAME / GLASS. LEAD REQUIREMENTS TO MATCH ADJACENT WALL U.O.N.
SPG	SPANDREL GLASS
STL	STEEL
SM	SMOKE BARRIER SEAL (NON-RATED DOOR W/ TIGHT FITTING SMOKE GASKET)
UC	UNDERCUT
VP	VISION PANEL
WF	WELDED STEEL FRAME
WG	WIRE GLASS
WD	WOOD
WS	WAVE SENSOR

PLEASE RECYCLE

2/10/2022 8:48:30 AM

AGENCY APPROVAL:

Chaffey College

HMC Architects

5009006-000

3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

LICENSED ARCHITECT KENNETH SALTER NO. C-19082 REN. 11-30-21 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

NOTES

1. FOR DOORS INDICATED WITH "ADG-1" SEE ACOUSTIC DOOR GASKET SPECIFICATIONS (08 71 00) FOR ADDITIONAL REQUIREMENTS IN ADDITION TO ANY REQUIREMENTS OUTLINED IN THE DOOR HARDWARE GROUP.

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

DOOR SCHEDULE

ADDENDUM #2

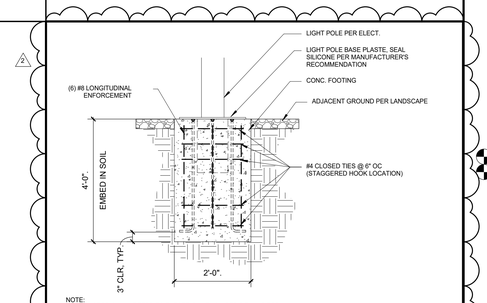
FILE NO.: **36-C1** A# : **04-119722**

DATE: **08.05.2021** CLIENT PROJ NO:

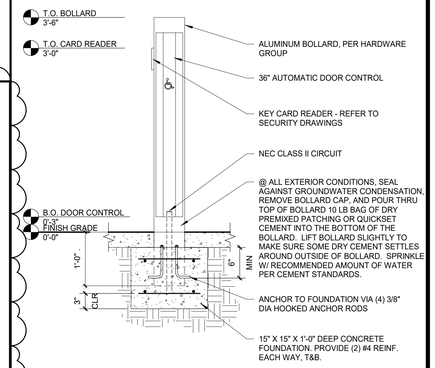
SHEET:

A9.11

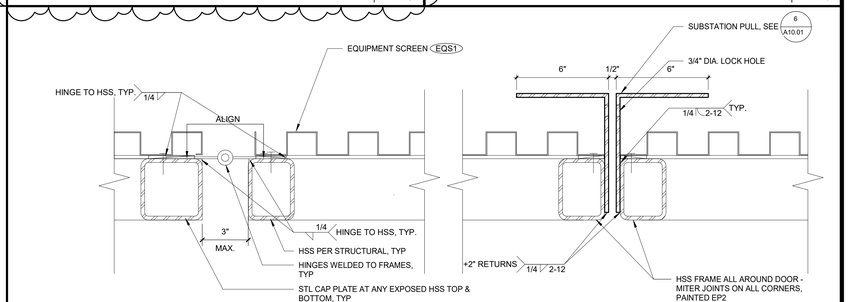
THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL PAGE SIZE



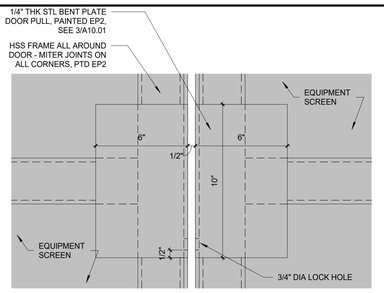
LIGHTING FIXTURE TYPE P FOOTING 9 — 1" = 1'-0"



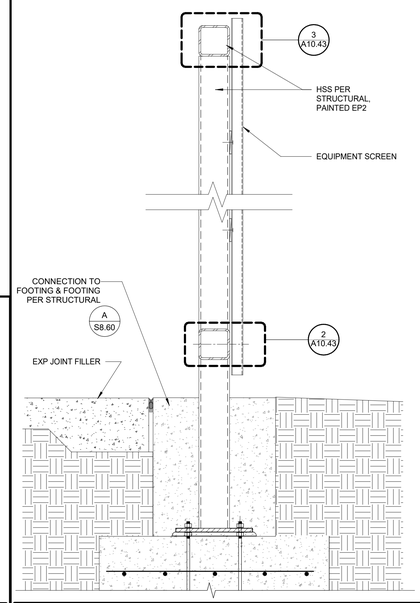
ACCESS AUTO DOOR OPERATOR BOLLARD 4 — 1" = 1'-0"



SUBSTATION SCREEN - HINGE 3 — 3" = 1'-0"



SUBSTATION - PULL 6 — 3" = 1'-0"



SUBSTATION SCREEN - POST 1 — 1 1/2" = 1'-0"

2/10/2022 2:26:01 PM

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AGENCY APPROVAL:

Chaffey College

HMC Architects

5009006-000

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LICENSED ARCHITECT KENNETH SALYER NO. C-19982 REN. 11-30-22 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

SITE DETAILS

ADDENDUM #2

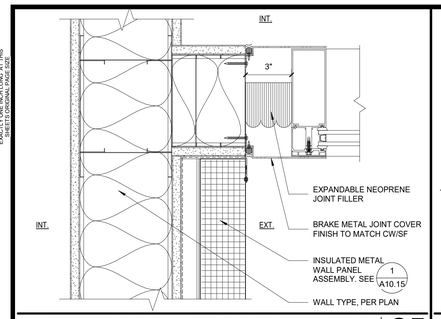
FILE NO.: 36-C1 | A# : 04-119722

DATE: 08.05.2021 | CLIENT PROJ NO:

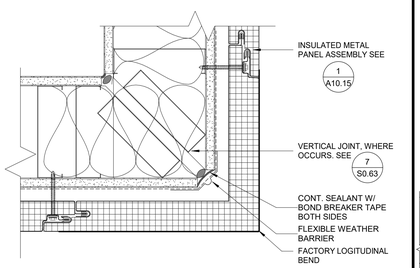
SHEET:

A10.01

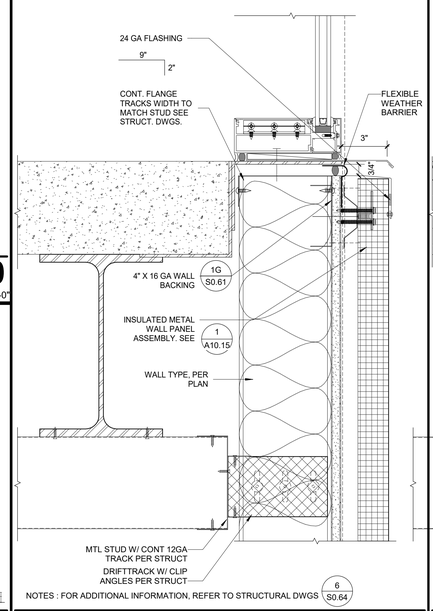
THE LINE SHOWN ABOVE IS 3" LONG ON THIS SHEET'S ORIGINAL SPACE SIZE



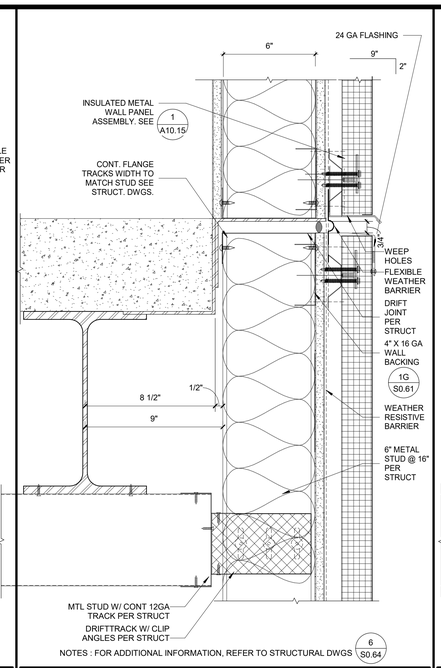
EXTERIOR WALL - INSIDE CORNER MP @ DRIFT JOINT — 25 — 3" = 1'-0"



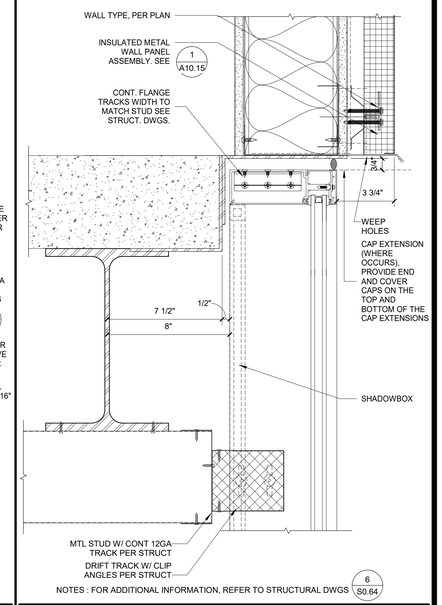
DEFLECTION JOINT @ OUTSIDE CORNER MTL PANEL — 20 — 3" = 1'-0"



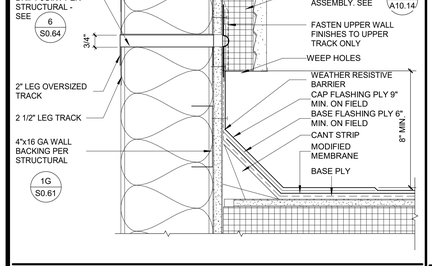
DRIFT JOINT @ FLOOR/CW SILL - IMP — 14 — 3" = 1'-0"



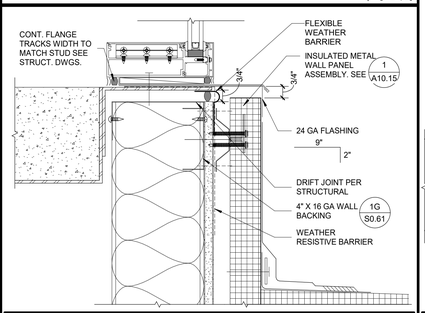
DRIFT JOINT @ FLOOR - IMP — 9 — 3" = 1'-0"



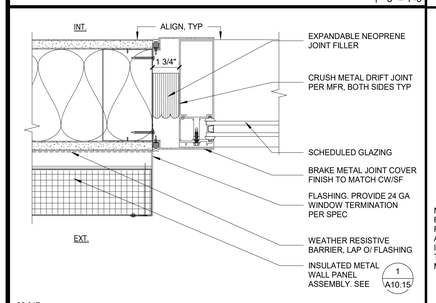
DRIFT JOINT @ FLOOR/CW HEAD - IMP — 4 — 3" = 1'-0"



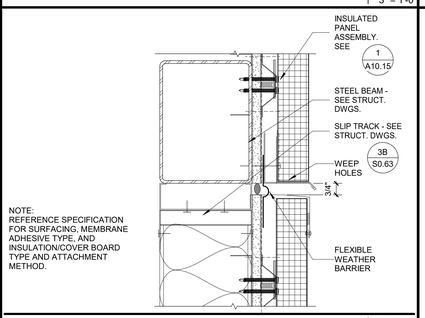
DRIFT JOINT @ EXT PLASTER - ROOF — 24 — 3" = 1'-0"



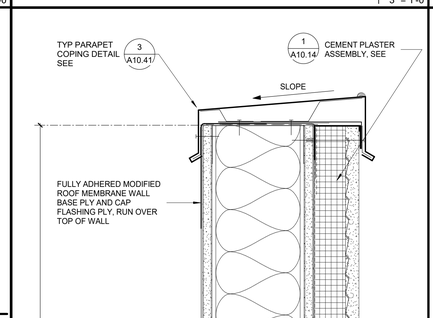
DRIFT JOINT @ FLOOR/CW SILL - ROOF — 19 — 3" = 1'-0"



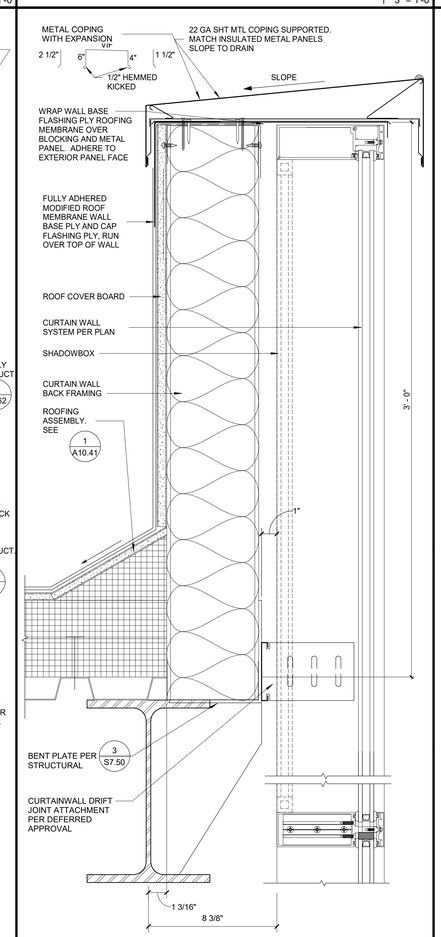
EXT CW JAMB @ IMP W/ DRIFT JOINT — 23 — 3" = 1'-0"



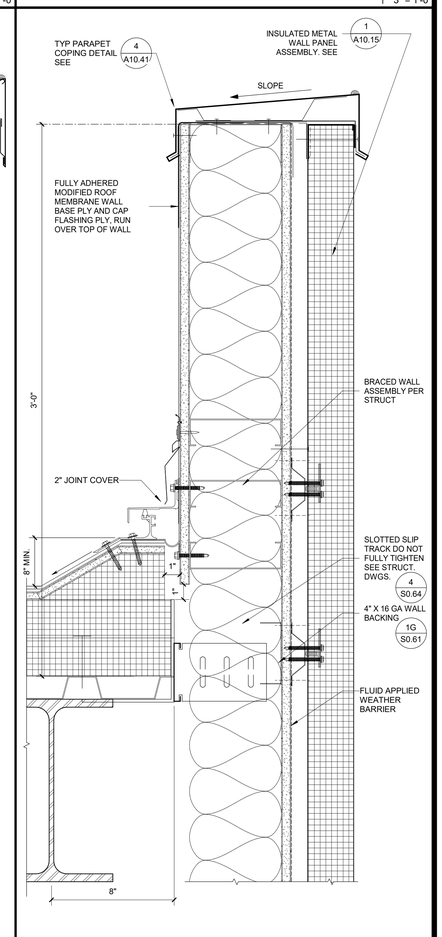
DRIFT JOINT @ STAIR #2 BEAM - IMP — 18 — 3" = 1'-0"



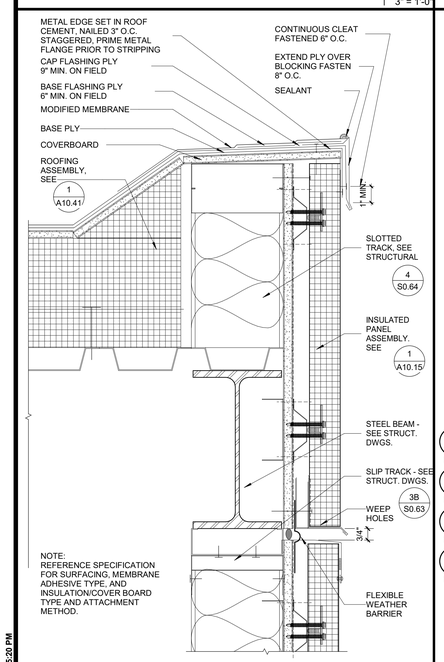
DRIFT JOINT @ ROOF PARAPET - PLASTER — 11 — 3" = 1'-0"



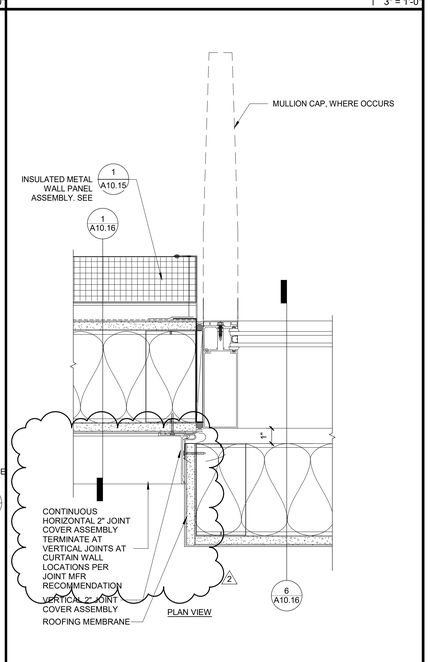
DRIFT JOINT @ ROOF PARAPET - CW — 6 — 3" = 1'-0"



DRIFT JOINT @ ROOF PARAPET - IMP — 1 — 3" = 1'-0"



DRIFT JOINT @ STAIR #2 ROOF PARAPET - IMP — 21 — 3" = 1'-0"



EXT CW JAMB W/ ALUMINUM CAP EXTENSION @ IMP W/ DRIFT JOINT — 16 — 3" = 1'-0"

2/10/2022 1:15:23 PM

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AGENCY APPROVAL:

Chaffey College

HMC Architects

5009006-000

LICENSED ARCHITECT KENNETH SALTER NO. C-19082 REN. 11-30-23 STATE OF CALIFORNIA

3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

WALL DETAILS - DRIFT JOINTS

ADDENDUM #2

FILE NO.: **36-C1** | A# : **04-119722**

DATE: **08.05.2021** | CLIENT PROJ NO:

SHEET:

A10.16

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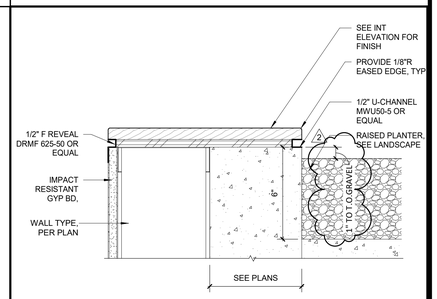
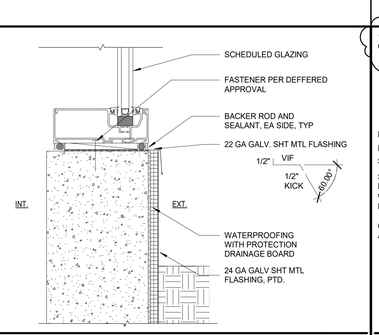
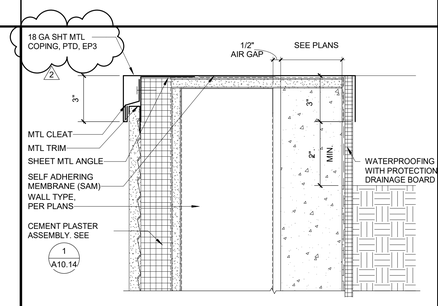


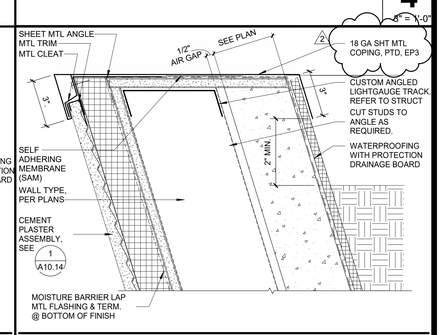
INTERIOR PLANTER WALL - TOP 4 — 3" = 1'-0"



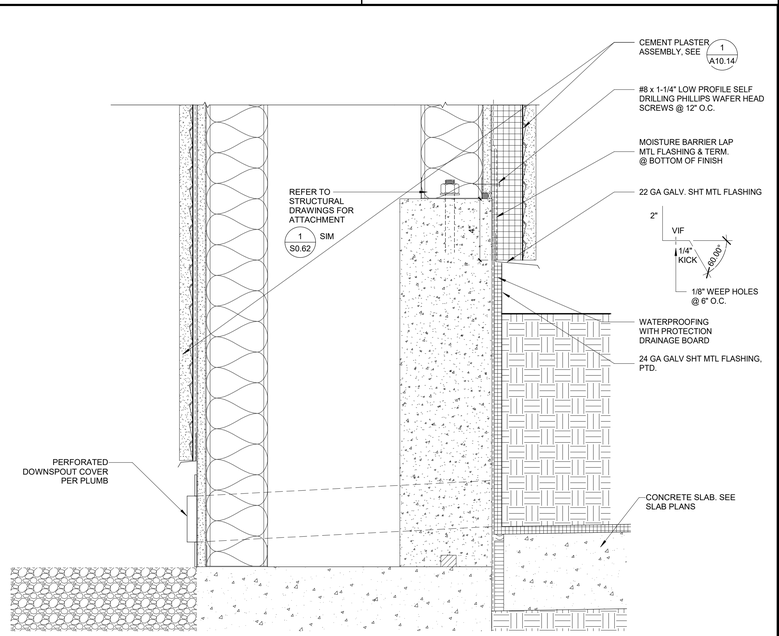
EXTERIOR WALL - PLANTER - CW ON TOP 13 — 3" = 1'-0"



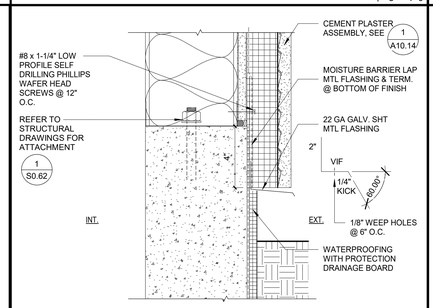
EXTERIOR WALL - PLANTER - WALL TOP 8 — 3" = 1'-0"



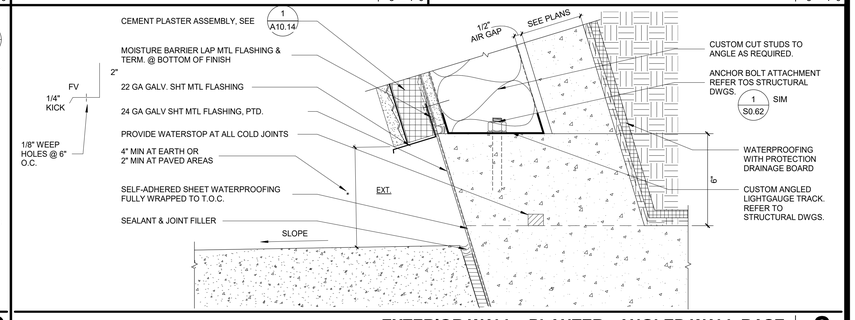
EXTERIOR WALL - PLANTER - ANGLED WALL TOP 3 — 3" = 1'-0"



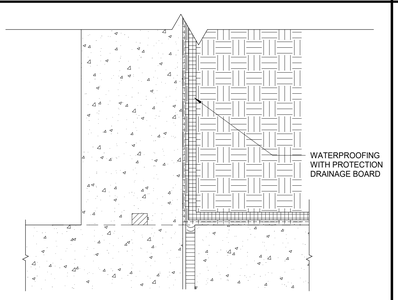
EXTERIOR WALL - PLANTER - DRAINAGE 16 — 3" = 1'-0"



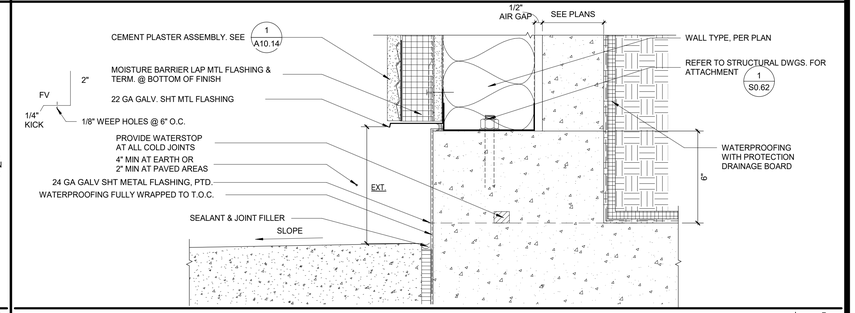
EXTERIOR WALL - PLANTER - WALL ON TOP 12 — 3" = 1'-0"



EXTERIOR WALL - PLANTER - ANGLED WALL BASE 2 — 3" = 1'-0"



EXTERIOR WALL - PLANTER WALL CONCRETE BASE 11 — 3" = 1'-0"



EXTERIOR WALL - PLANTER WALL BASE 1 — 3" = 1'-0"

2/10/2022 10:57:14 AM

PLEASE RECYCLE

AGENCY APPROVAL:

Chaffey College

HMC Architects

5009006-000

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LICENSED ARCHITECT — KENNETH SALYER — NO. C-19082 — REN. 11-30-22 — STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

PLANTER DETAILS

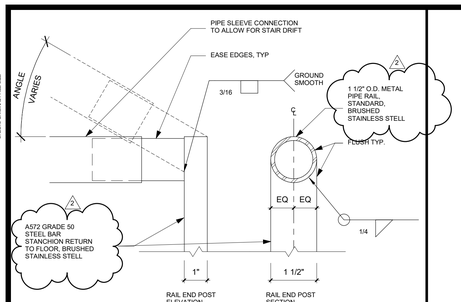
ADDENDUM #2

FILE NO.: **36-C1** | A# : **04-119722**

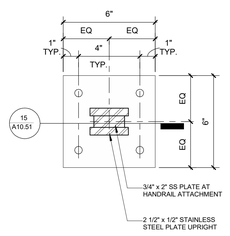
DATE: **08.05.2021** | CLIENT PROJ NO:

SHEET:

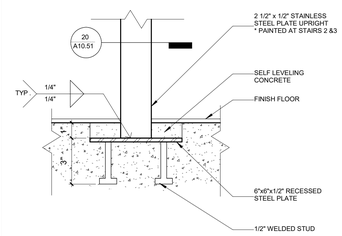
A10.17



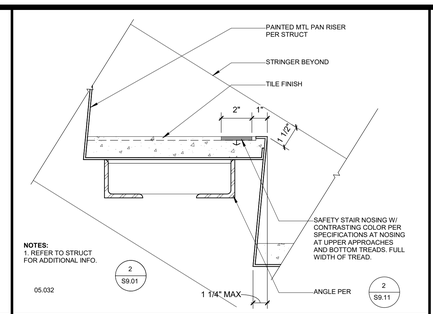
HANDRAIL @ SLEEVE CONNECTION — 25
6" = 1'-0"



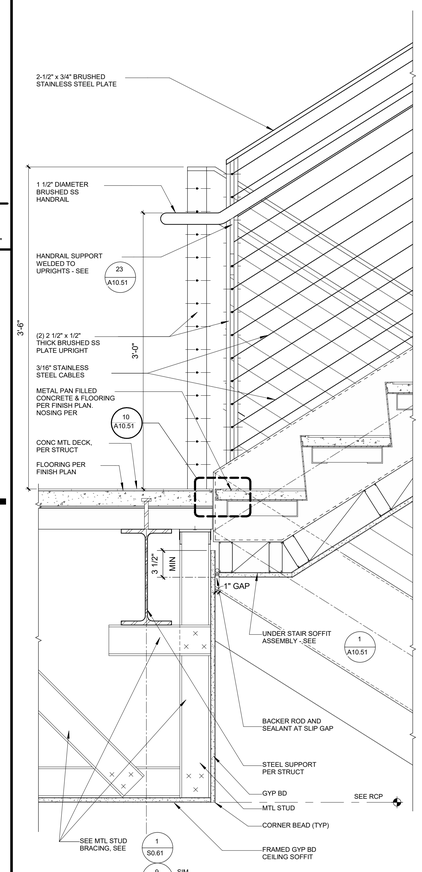
ENLARGED PLAN OF GUARDRAIL BASE PLATE — 20
3" = 1'-0"



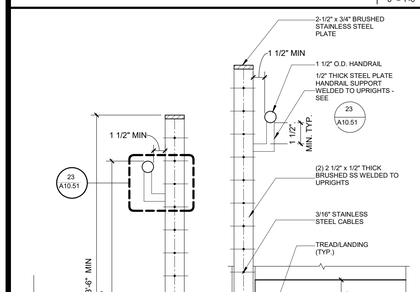
GUARDRAIL BASE SECTION @ SLAB ON GRADE — 15
3" = 1'-0"



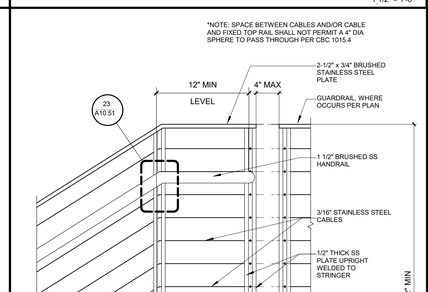
STAIR NOSING - GROOVED1 — 10
3" = 1'-0"



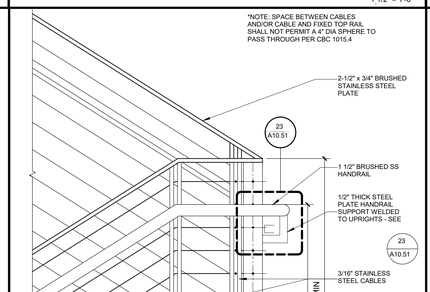
STAIR ELEVATION LEVEL 2 LANDING — 3
1 1/2" = 1'-0"



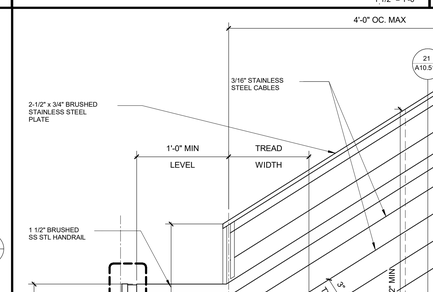
TYP. RECESSED LINEAR FIXTURE @ FRAMED GYP. CEILING/ WALL — 24
3" = 1'-0"



INTERMEDIATE STAIR LANDING 02 — 18
1 1/2" = 1'-0"



STAIR @ LANDING SECTION — 13
1 1/2" = 1'-0"



STAIR LANDING END SECTION — 8
1 1/2" = 1'-0"

HANDRAIL — 23
6" = 1'-0"

TOP STAIR LANDING 01 — 16
1 1/2" = 1'-0"

INTERMEDIATE STAIR LANDING 01 — 11
1 1/2" = 1'-0"

STAIR FOOT LANDING TRANSITION ELEVATION — 1
1 1/2" = 1'-0"

SECTION THRU STAIR — 21
1 1/2" = 1'-0"

AGENCY APPROVAL:

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LICENSED ARCHITECT KENNETH SALYER NO. C-19082 REN. 11-30-23 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

FACILITY:
CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
STAIR DETAILS

ADDENDUM #2

FILE NO.: 36-C1 — A# : 04-119722

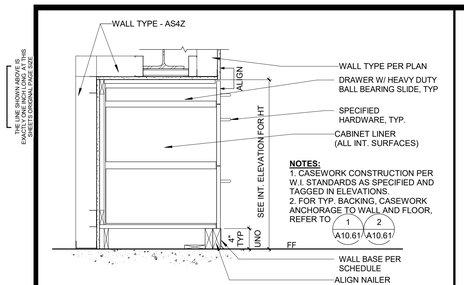
DATE: 08.05.2021 — CLIENT PROJ NO:

SHEET:

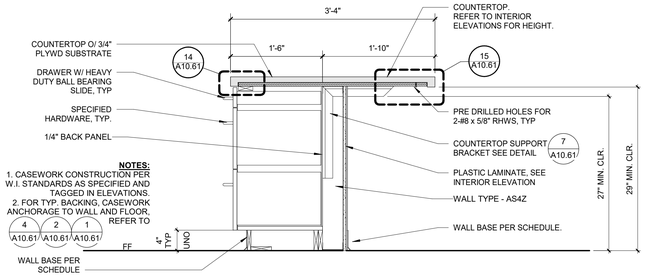
A10.51

2/8/2022 11:35:55 AM

PLEASE RECYCLE

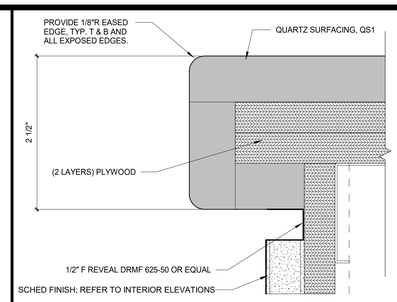


RECESSED BASE CABINET | 25
1" = 1'-0"

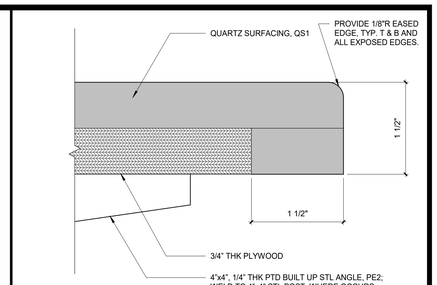


NOTE: THERE SHALL BE NO SHARP OR ABRASIVE SURFACES BELOW COUNTER

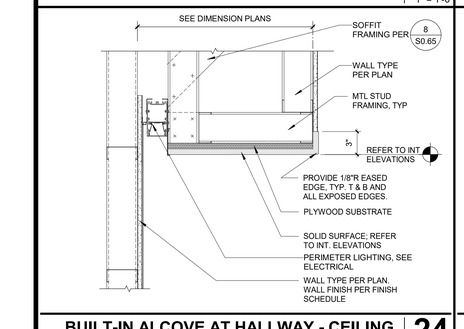
COUNTERTOP SUPPORT @ ISLAND | 15
1" = 1'-0"



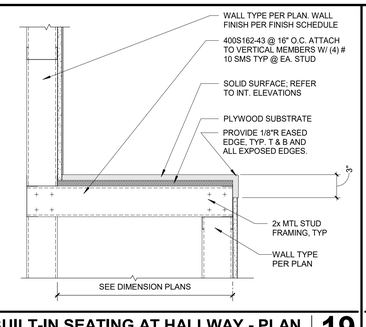
RECEPTION DESK - SURFACE EDGE 02 | 10
12" = 1'-0"



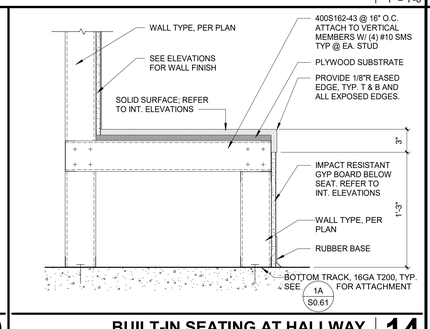
RECEPTION DESK - SURFACE EDGE 01 | 5
12" = 1'-0"



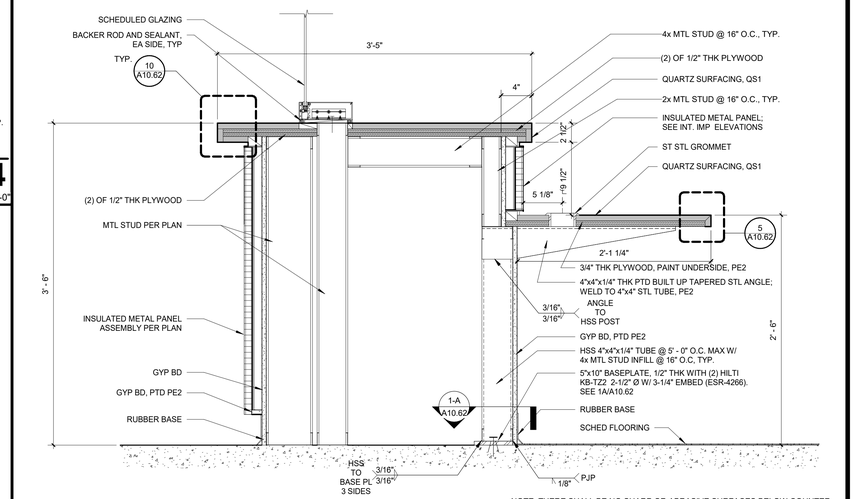
BUILT-IN ALCOVE AT HALLWAY - CEILING | 24
1 1/2" = 1'-0"



BUILT-IN SEATING AT HALLWAY - PLAN VIEW | 19
1 1/2" = 1'-0"

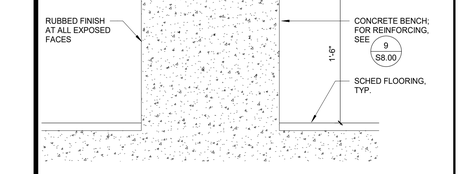


BUILT-IN SEATING AT HALLWAY | 14
1 1/2" = 1'-0"

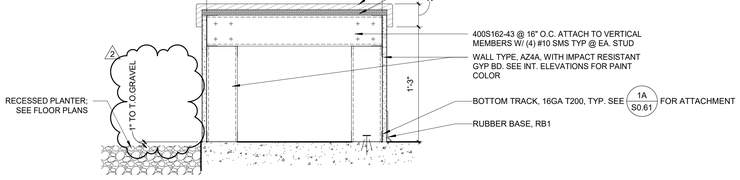


NOTE: THERE SHALL BE NO SHARP OR ABRASIVE SURFACES BELOW COUNTER

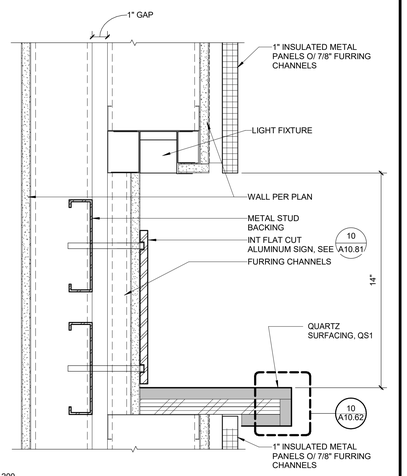
RECEPTION DESK - SECTION AT CW | 3
1 1/2" = 1'-0"



INT. CONCRETE BENCH | 23
1 1/2" = 1'-0"

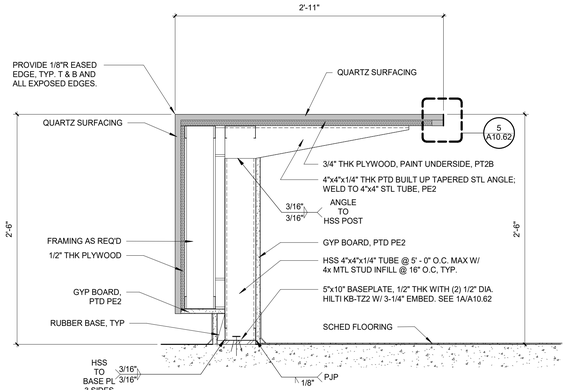


BUILT-IN SEATING AT PLANTER | 13
1 1/2" = 1'-0"



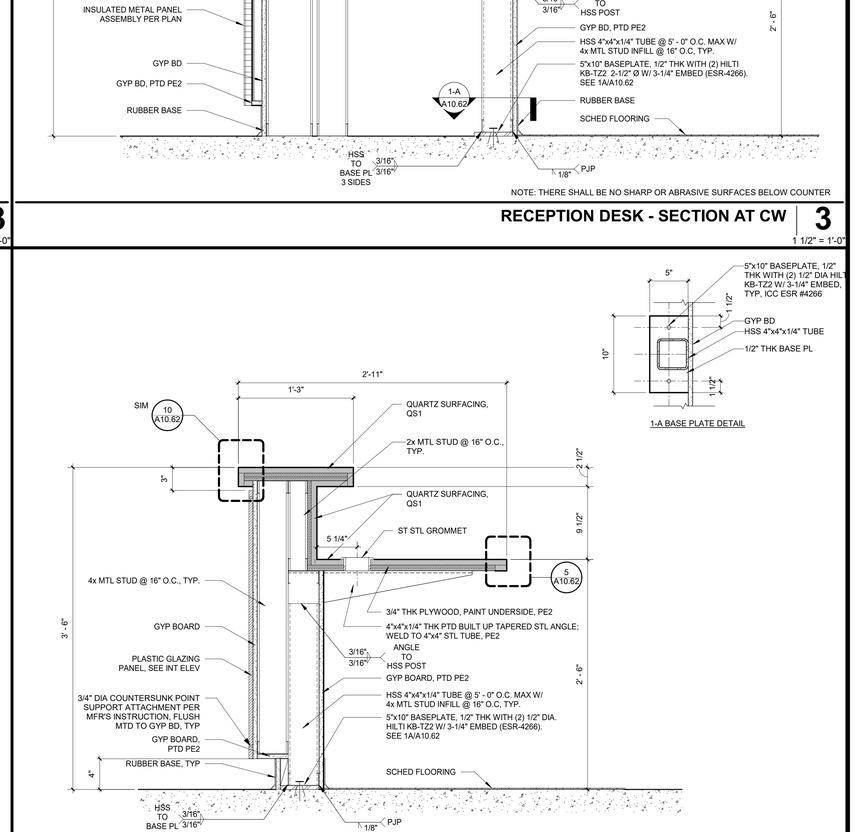
09.200

LOBBY ALCOVE | 21
3" = 1'-0"



NOTE: THERE SHALL BE NO SHARP OR ABRASIVE SURFACES BELOW COUNTER

RECEPTION DESK - SECTION 02 | 11
1 1/2" = 1'-0"



NOTE: THERE SHALL BE NO SHARP OR ABRASIVE SURFACES BELOW COUNTER

RECEPTION DESK - SECTION 01 | 1
1 1/2" = 1'-0"

2/1/2022 10:58:06 AM

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AGENCY APPROVAL:

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HMC Architects

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LICENSED ARCHITECT KENNETH SALTER NO. C-19082 REN. 11-30-22 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

MILLWORK DETAILS

ADDENDUM #2

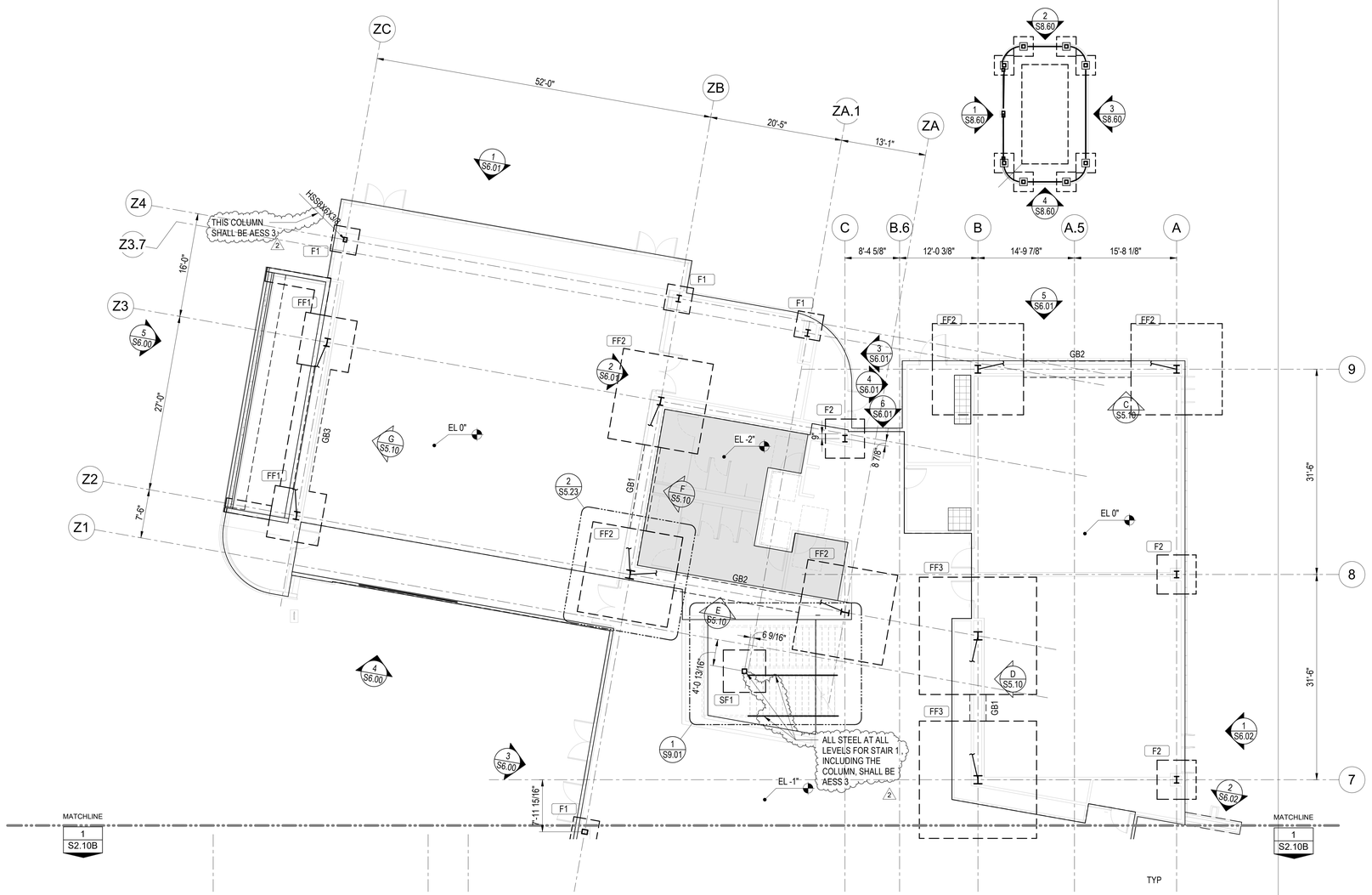
FILE NO.: **36-C1** | A# : **04-119722**

DATE: **08.05.2021** | CLIENT PROJ NO:

SHEET:

A10.62

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL PAPER SIZE



FOUNDATION PLAN NOTES

1. FOR GENERAL NOTES SEE **S0.X** SERIES SHEETS. TYPICAL DETAILS OCCUR THROUGHOUT THESE STRUCT DWGS IN ADDITION TO THOSE ON **S2.X** SERIES SHEETS.
2. VERIFY CONC SLAB ELEVATIONS INCLUDING SLAB DEPRESSIONS, SLOPES, OPNGS, CURBS, DRAINS, TRENCHES, & SLAB EDGE LOCATIONS; & WALL OVERALL DIMENSIONS INCLUDING LOCATIONS OF OPNGS WITH ARCHITECTURAL DWGS.
3. SEE ARCHITECTURAL DWGS FOR REMAINDER OF DIMENSIONS & ELEVATIONS NOT SHOWN ON STRUCT DWGS. VERIFY ALL DIMENSIONS & ELEVATIONS W/ ARCHITECTURAL DWGS PRIOR TO START OF WORK.
4. VERIFY EXTENT OF EXISTING UNDERGROUND UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
5. FOUNDATION EXCAVATIONS MUST BE OBSERVED AND APPROVED BY PROJECT GEOTECHNICAL CONSULTANT PRIOR TO PLACING REINFORCING STEEL.
6. LOCATE NEW SUBGRADE UTILITIES AS INDICATED ON STRUCT AND MEP DRAWINGS. IDENTIFY LOCATIONS AND INVERT ELEVATIONS OF AFFECTED EXISTING UTILITIES PRIOR TO START OF WORK. NOTIFY SEOR IF LOCATIONS ARE OTHER THAN AS NOTED, OR REQUIRE ADDITIONAL DEMO, CONSTRUCTION, OR EXCAVATION BELOW NOTED LIMIT LINES. DO NOT PENETRATE EXISTING STRUCTURE OR EXCAVATE BELOW EXISTING OR NEW FOUNDATIONS WITHOUT APPROVAL OF SEOR.
7. CENTER COLUMNS ON GRIDLINES UNO.
8. LOCATE TOP OF FOOTINGS 1'-6" BELOW LOWEST ADJACENT BUILDING SLAB ON GRADE ELEVATION OR TOP OF LOWEST ADJACENT EXTERIOR FINISH GRADE (OR FINISH PAVING) ELEVATION UNO.
9. TYPICAL SLAB ON GRADE SHALL BE AS FOLLOWS UNO:
   A. 5" CONCRETE SLAB W/ #4@18"OC EACH WAY AT CENTER OF SLAB OVER
   B. 15 MIL MOISTURE BARRIER OVER 4" MOISTENED (NOT SATURATED) CLEAN AGGREGATE OVER
   C. COMPACTED FILL PER GEOTECHINCAL REPORT.
10. PROVIDE CONSTRUCTION JOINTS AND CONTROL JOINTS IN SLAB ON GRADE PER **5** / **S0.12** AND AS REQD PER ARCHITECTURAL DWGS.
11. PROVIDE STRUCTURAL STEEL FRAMING TO SUPPORT ELEVATOR GUIDERAILS AND ELEVATOR COUNTERWEIGHTS PER **S0.91**.

FOUNDATION LEGEND

- EL XXX'-XX" — TOP OF SLAB ELEVATION - VERIFY W/ ARCHITECTURAL DWGS
- F1 -1'-6" — SPREAD FOOTING TYPE PER **1** / **S3.01**; TOP OF FTG ELEVATION, SEE NOTE 8
- S — STEP IN CONTINUOUS FOOTING OR GRADE BEAM PER SYMBOL DENOTES LOCATION OF STEP AT TOP OF FOOTING
- TOF -X'-X" — TOP OF FOOTING ELEVATION RELATIVE TO TOP OF LOWEST ADJACENT BUILDING SLAB ON GRADE ELEVATION OR TOP OF LOWEST ADJACENT EXTERIOR FINISH GRADE (OR FINISH PAVING) ELEVATION, WHICHEVER IS LOWER - IF NO ELEVATION INDICATED, PLAN NOTE 8 APPLIES
- NON-FRAME STEEL COLUMN MARK - SEE COLUMN SCHEDULE ON SHEET **S4.01**.
- X" — CHANGE IN TOP OF SLAB ON GRADE ELEVATION - VERIFY DROP DISTANCES (WHERE INDICATED) W/ ARCHITECTURAL DWGS
- XX / XX — MECH UNIT NO - SEE MECH DWGS
- XXX# — MAXIMUM DESIGN OPERATING WT
- MECH PAD - SEE **2** / **S0.12**
- DEPRESSED SLAB - SEE **7D** / **S0.12** UNO
- GB1 — GRADE BEAM - SEE **4** / **S5.22**

1ST FLOOR FOUNDATION PLAN - SEGMENT A — SCALE: 1/8" = 1'-0" — **1**

TN

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2/4/2022 10:44:22 AM

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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.2022

KEYNOTES

NOTES

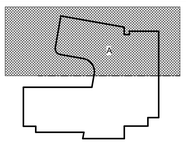
CONSULTANT

saiful•bouquet structural engineers
155 North Lake Avenue, 6th Floor
Pasadena, CA 91101
Telephone 626.304.2616
www.saifulbouquet.com

SB Job No:20505

REGISTERED PROFESSIONAL ENGINEER — M. SAIFUL BOUQUET — No. 4083 — EXP. 06/30/22 — STRUCTURAL — STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

1ST FLOOR FOUNDATION - SEGMENT A

ADDENDUM #2

FILE NO.: **36-C1** — A# : **04-119722**

DATE: **06.17.2021** — CLIENT PROJ NO:

SHEET:

S2.10A

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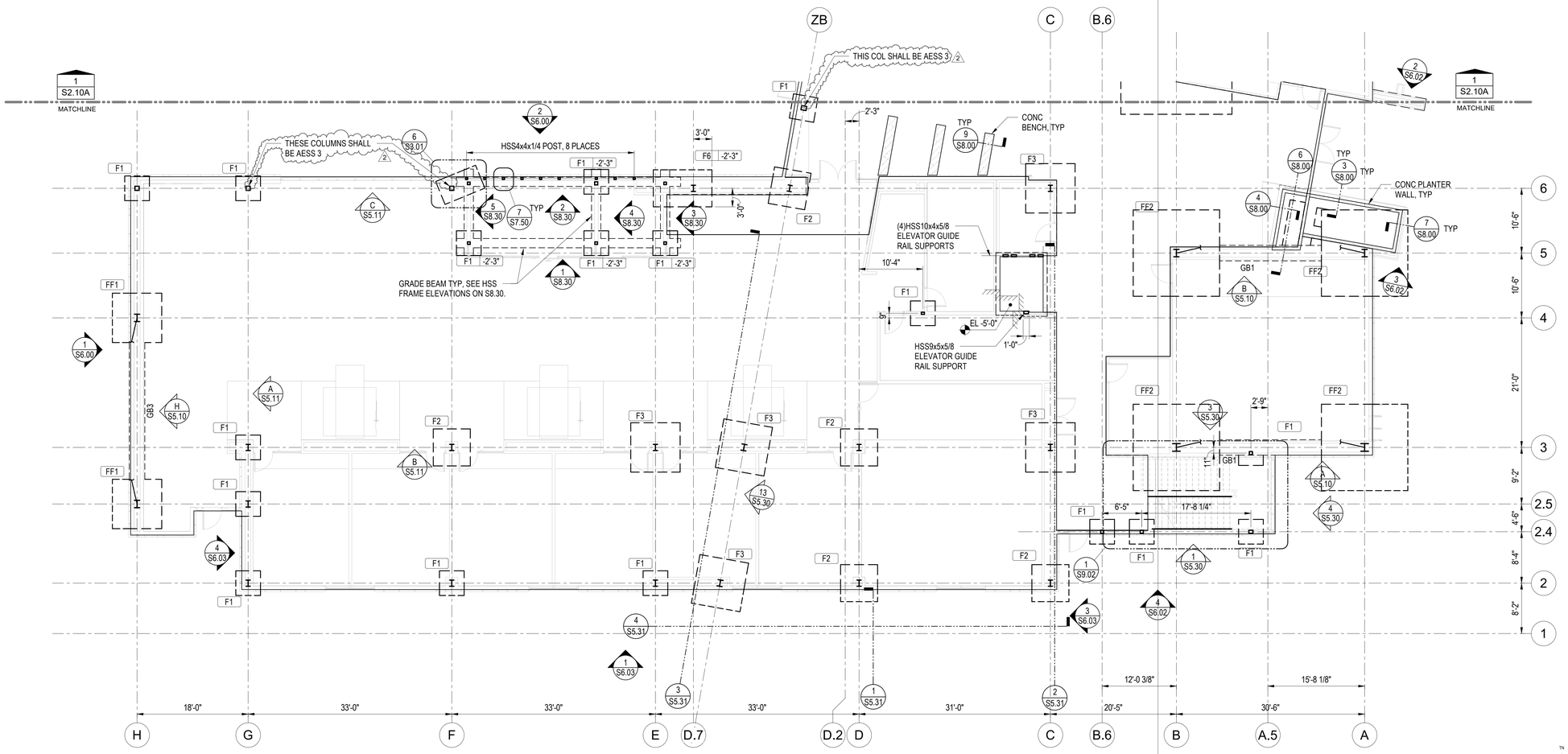
FOUNDATION PLAN NOTES

1. FOR GENERAL NOTES SEE **S0.X** SERIES SHEETS. TYPICAL DETAILS OCCUR THROUGHOUT THESE STRUCT DWGS IN ADDITION TO THOSE ON **S2.X** SERIES SHEETS.
2. VERIFY CONC SLAB ELEVATIONS INCLUDING SLAB DEPRESSIONS, SLOPES, OPNGS, CURBS, DRAINS, TRENCHES, & SLAB EDGE LOCATIONS; & WALL OVERALL DIMENSIONS INCLUDING LOCATIONS OF OPNGS WITH ARCHITECTURAL DWGS.
3. SEE ARCHITECTURAL DWGS FOR REMAINDER OF DIMENSIONS & ELEVATIONS NOT SHOWN ON STRUCT DWGS. VERIFY ALL DIMENSIONS & ELEVATIONS W/ ARCHITECTURAL DWGS PRIOR TO START OF WORK.
4. VERIFY EXTENT OF EXISTING UNDERGROUND UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
5. FOUNDATION EXCAVATIONS MUST BE OBSERVED AND APPROVED BY PROJECT GEOTECHNICAL CONSULTANT PRIOR TO PLACING REINFORCING STEEL.
6. LOCATE NEW SUBGRADE UTILITIES AS INDICATED ON STRUCT AND MEP DRAWINGS. IDENTIFY LOCATIONS AND INVERT ELEVATIONS OF AFFECTED EXISTING UTILITIES PRIOR TO START OF WORK. NOTIFY SEOR IF LOCATIONS ARE OTHER THAN AS NOTED, OR REQUIRE ADDITIONAL DEMO, CONSTRUCTION, OR EXCAVATION BELOW NOTED LIMIT LINES. DO NOT PENETRATE EXISTING STRUCTURE OR EXCAVATE BELOW EXISTING OR NEW FOUNDATIONS WITHOUT APPROVAL OF SEOR.
7. CENTER COLUMNS ON GRIDLINES UNO.
8. LOCATE TOP OF FOOTINGS 1'-6" BELOW LOWEST ADJACENT BUILDING SLAB ON GRADE ELEVATION OR TOP OF LOWEST ADJACENT EXTERIOR FINISH GRADE (OR FINISH PAVING) ELEVATION UNO.
9. TYPICAL SLAB ON GRADE SHALL BE AS FOLLOWS UNO:
   A. 5" CONCRETE SLAB W/ #4@18"OC EACH WAY AT CENTER OF SLAB OVER
   B. 15 MIL MOISTURE BARRIER OVER 4" MOISTENED (NOT SATURATED) CLEAN AGGREGATE OVER
   C. COMPACTED FILL PER GEOTECHINCAL REPORT.
10. PROVIDE CONSTRUCTION JOINTS AND CONTROL JOINTS IN SLAB ON GRADE PER **5** / **S0.12** AND AS REQD PER ARCHITECTURAL DWGS.
11. PROVIDE STRUCTURAL STEEL FRAMING TO SUPPORT ELEVATOR GUIDERAILS AND ELEVATOR COUNTERWEIGHTS PER **S0.91**.

FOUNDATION LEGEND

- EL XXX'-XX" — TOP OF SLAB ELEVATION - VERIFY W/ ARCHITECTURAL DWGS
- F1 -1'-6" — SPREAD FOOTING TYPE PER **1** / **S3.01**
- TOP OF FTG ELEVATION, SEE NOTE 8
- STEP IN CONTINUOUS FOOTING OR GRADE BEAM PER SYMBOL DENOTES LOCATION OF STEP AT TOP OF FOOTING
- TOF -X'-X" — TOP OF FOOTING ELEVATION RELATIVE TO TOP OF LOWEST ADJACENT BUILDING SLAB ON GRADE ELEVATION OR TOP OF LOWEST ADJACENT EXTERIOR FINISH GRADE (OR FINISH PAVING) ELEVATION, WHICHEVER IS LOWER - IF NO ELEVATION INDICATED, PLAN NOTE 8 APPLIES
- NON-FRAME STEEL COLUMN MARK - SEE COLUMN SCHEDULE ON SHEET **S4.01**.
- X" — CHANGE IN TOP OF SLAB ON GRADE ELEVATION - VERIFY DROP DISTANCES (WHERE INDICATED) W/ ARCHITECTURAL DWGS
- XX / XX / XXX# — MECH UNIT NO - SEE MECH DWGS; MAXIMUM DESIGN OPERATING WT
- MECH PAD - SEE **2** / **S0.12**
- DEPRESSED SLAB - SEE **7D** / **S0.12** UNO
- GB1 — GRADE BEAM - SEE **4** / **S5.22**



1ST FLOOR FOUNDATION PLAN - SEGMENT B

SCALE: 1/8" = 1'-0"

1

PLEASE RECYCLE

2/4/2022 10:44:23 AM

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ONTARIO, CA 91764
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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.2022

KEYNOTES

NOTES

CONSULTANT

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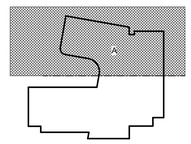
www.saifulbouquet.com
SB Job No:20505

REGISTERED PROFESSIONAL ENGINEER — S. U. L. — No. S 4083 — Exp. 06/30/22 — STRUCTURAL — STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

1ST FLOOR FOUNDATION - SEGMENT B

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

SHEET:

S2.10B

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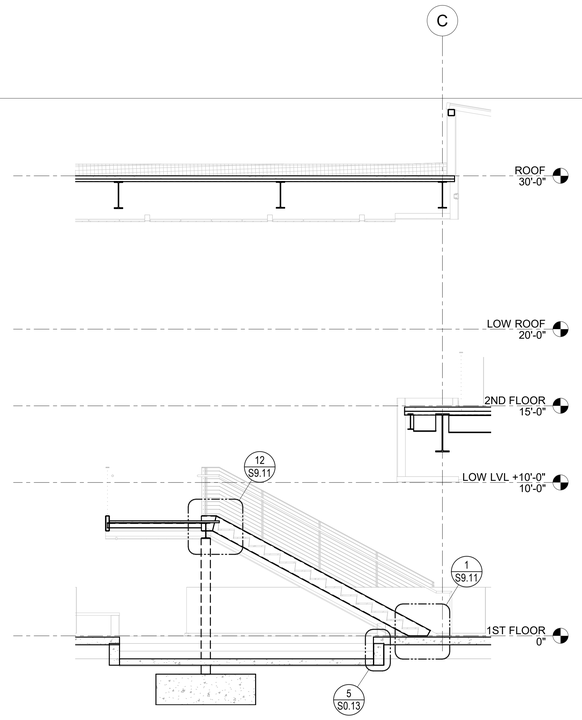

SECTION B
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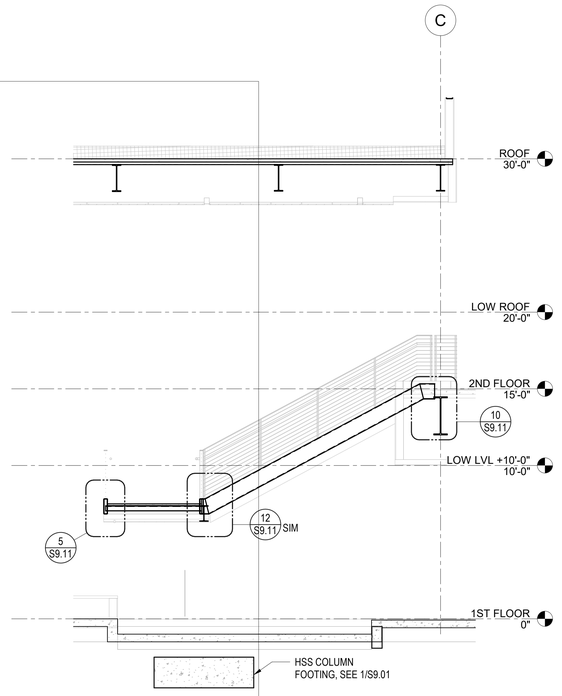
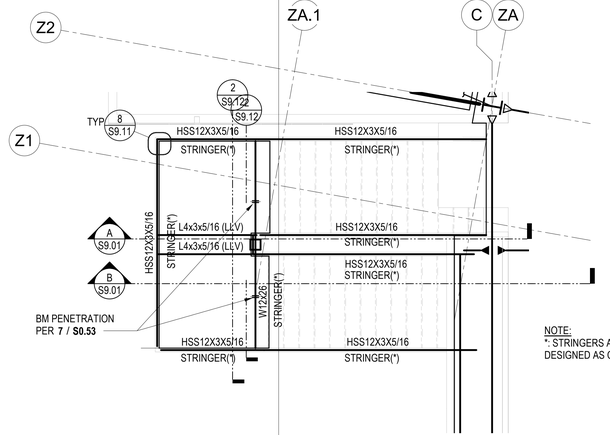


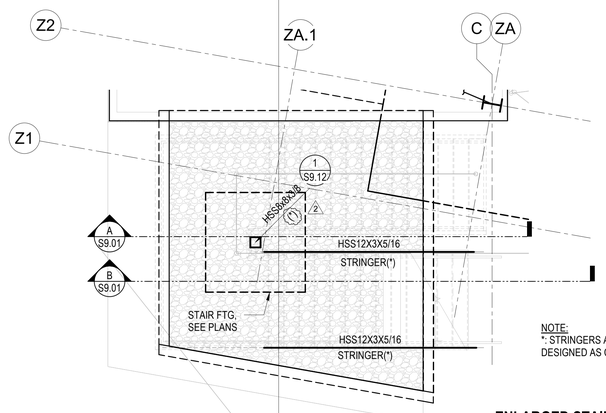
SECTION A
SCALE: 1/4" = 1'-0"

NOTES:
1. SEE **S2.10A** AND **S2.20A** FOR NOTES... 2
2. ALL STEEL NOTED WITH THE SYMBOL (*) SHALL BE AESS 3 2
3. ALL STAIR LANDING SHALL BE 3" NORMAL WEIGHT CONCRETE WITH 4X4/W2.0XW2.0 WWF AT SLAB CENTERLINE, TYP

STAIR PLAN FRAMING NOTES



ENLARGED STAIR 1 2ND FLOOR FRAMING PLAN
SCALE: 1/4" = 1'-0"



ENLARGED STAIR 1 FOUNDATION PLAN
SCALE: 1/4" = 1'-0"

AGENCY APPROVAL:

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Chaffey College

HMC Architects

5009006-000

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ENLARGED STAIR-1 PLANS AND SECTIONS

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

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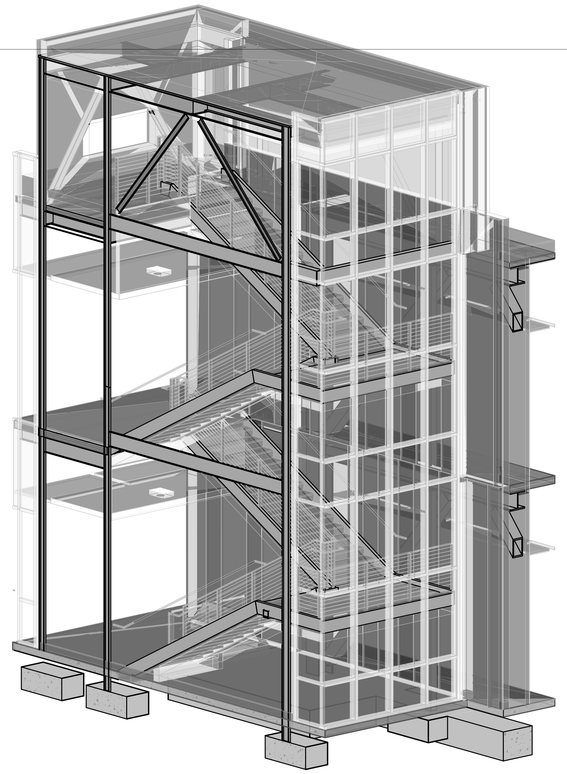

NOTES:
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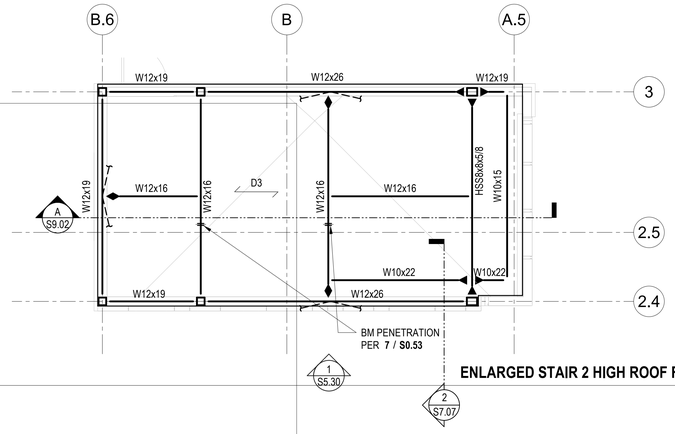
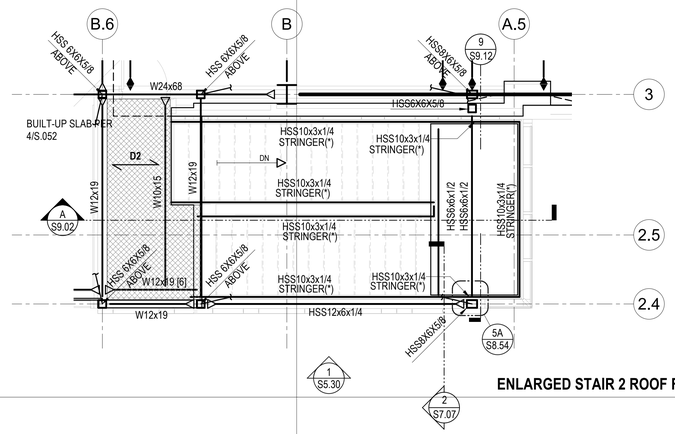
3. ALL STAIR LANDING SHALL BE 3" NORMAL WEIGHT CONCRETE WITH 4X4/W2.0XW2.0 WWF AT SLAB CENTERLINE, TYP

STAIR PLAN FRAMING NOTES

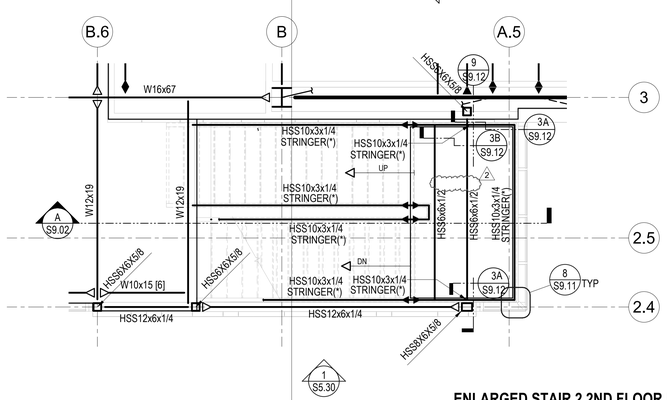
SECTION **A**
SCALE: 1/4" = 1'-0"



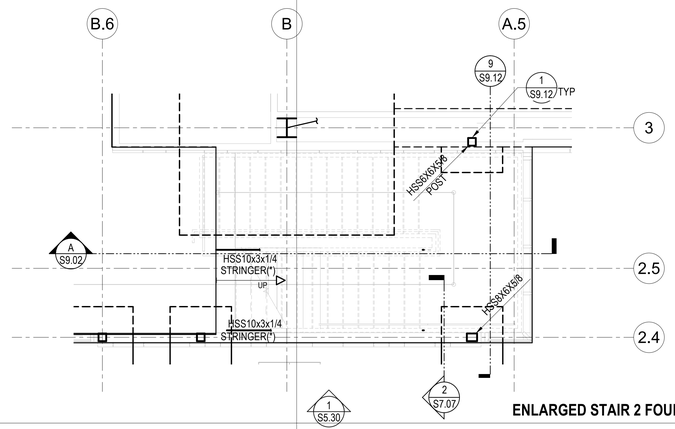
ENLARGED STAIR 2 HIGH ROOF FRAMING PLAN **4**
SCALE: 1/4" = 1'-0"



ENLARGED STAIR 2 ROOF FRAMING PLAN **3**
SCALE: 1/4" = 1'-0"



ENLARGED STAIR 2 2ND FLOOR FRAMING PLAN **2**
SCALE: 1/4" = 1'-0"



ENLARGED STAIR 2 FOUNDATION PLAN **1**
SCALE: 1/4" = 1'-0"

AGENCY APPROVAL:

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ENLARGED STAIR-2 PLANS AND SECTIONS

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

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PLUMBING LEGEND

PIPE & ACCESSORIES (PLANS)

- POINT OF CONNECTION
- POINT OF DISCONNECTION
- DEMOLITION OF PIPING, DEVICES, ETC.
- END OF DEMOLITION WORK
- FLOOR DRAIN
- FLOOR SINK
- COMBINATION ROOF / OVERFLOW DRAIN
- ROOF DRAIN / AREA DRAIN
- ROOF RECEPTOR
- FLOOR CLEANOUT
- WALL CLEANOUT
- HOSE BIBB
- LINE BREAK
- PIPE CAP
- END OF PIPE
- TEMPERATURE SENSOR
- FLEX CONNECTION
- UNION
- FLANGE
- FLOW DIRECTION
- DWV FITTING, 45° ELBOW
- DWV FITTING, 90° ELBOW
- DWV FITTING, 45° TEE
- DWV FITTING, 90° TEE
- PIPE DROP
- PIPE BRANCH, TEE UP
- PIPE BRANCH, TEE DOWN
- REVISION CLOUD AND DELTA
- XX / XX — EQUIPMENT TYPE / NUMBER TYPE
- X / PX.XX — DETAIL DESIGNATION / SHEET NUMBER

VALVES & ACCESSORIES (DIAGRAMS)

- PRESSURE REDUCING VALVE
- PRESSURE REDUCING VALVE GAS
- PRESSURE REDUCING VALVE - LINE FEED
- 2-WAY CONTROL VALVE, 2-POS
- 3-WAY CONTROL VALVE, 2-POS
- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- CIRCUIT SETTER/BALANCING VALVE
- FLOAT VALVE
- T&P RELIEF VALVE
- THERMOSTATIC MIXING VALVE
- SHUTOFF VALVE
- GLOBE VALVE
- WYE STRAINER
- WYE STRAINER WITH BLOW OFF
- GATE VALVE
- MANUAL AIR VENT
- PLUG VALVE
- SOLENOID CONTROL VALVE, 2-POS
- TEMP GUAGE
- PRESSURE GUAGE
- THERMOMETER
- VACUUM BREAKER
- VFD — VARIABLE FREQUENCY DRIVE
- REDUCER
- CEILING ACCESS PANEL (AP)
- WALL MOUNTED ACCESS PANEL (AP)

EQUIPMENT & ACCESSORIES (DIAGRAMS)

- EXPANSION TANK
- HEAT EXCHANGER
- PUMP
- FLOOR DRAIN (FD-X)
- OVERFLOW DRAIN (ODX)
- ROOF DRAIN (RD-X)
- PLANTER GARAGE DRAIN (PD-X / GD-X)
- PLUMBING WATER CLOSET (WC-X)
- LAVATORY (LAV-X)
- END OF PIPE - CLEANOUT
- END OF PIPE - FLOOR CLEANOUT
- END OF PIPE - WALL CLEANOUT
- 2 WAY CLEANOUT CLEANOUT
- VTR (VENT THRU ROOF)
- WHA — WATER HAMMER ARRESTOR
- TP — TRAP PRIMER
- WM-XX — WATER METER
- BFP-XX — BACKFLOW PREVENTER

PIPE LINE DESIGNATIONS

Line	Description
CW	DOMESTIC COLD WATER
HW	DOMESTIC HOT WATER SUPPLY
HWR	DOMESTIC HOT WATER RETURN
SAN	SANITARY SEWER
SAN	SANITARY SEWER (UNDERFLOOR)
V	SANITARY VENT
G	NATURAL GAS (LOW PRESSURE)
MG	NATURAL GAS (MEDIUM PRESSURE)
TP	TRAP PRIMER WATER
CD	CONDENSATE DRAIN
FW	FIRE PROTECTION WATER
RW	RECLAIMED WATER
SD	STORM DRAIN
OD	OVERFLOW DRAIN
FO	FUEL OIL

PIPE LINE DESIGNATIONS (LAB)

Line	Description
ICW	INDUSTRIAL COLD WATER
IHW	INDUSTRIAL HOT WATER
IHWR	INDUSTRIAL HOT WATER RETURN
LW	LAB WASTE
LV	LAB VENT
DIS	DEIONIZED WATER SUPPLY
DIR	DEIONIZED WATER RETURN
N2	NITROGEN
O2	OXYGEN
CO2	CARBON DIOXIDE
CA	COMPRESSED AIR (100 PSIG)
CONT	CONTAINMENT PIPING
LA	LAB AIR (15 PSIG)
RO	REVERSE OSMOSIS WATER SUPPLY
PW	PURIFIED WATER SUPPLY
VAC	VACUUM PIPING

FIRE PROTECTION LEGEND

Line	Description
FW	FIRE WATER SUPPLY
SP	WET SPRINKLER PIPING
DSP	DRY STANDPIPE
CSP	COMBINATION SPRINKLER /STANDPIPE
WSP	WET STAND PIPE
FHV	FIRE HOSE VALVE
FDC	FIRE DEPARTMENT CONNECTION
PIV	POST INDICATING VALVE
SPD	SPRINKLER DRAIN

CALIFORNIA CODES AND STANDARDS

1. 2019 CALIFORNIA ADMINISTRATIVE CODE, PART 1, TITLE 24 C.C.R.
2. 2019 CALIFORNIA ADMINISTRATIVE CODE, PART 2, TITLE 24 C.C.R.
   A. (2018 INTERNATIONAL BUILDING CODE VOLUMES 1 & 2 AND 2019 CALIFORNIA AMENDMENTS)
3. 2019 CALIFORNIA ELECTRICAL CODE (CEC), PART 3, TITLE 24 C.C.R.
   A. (2017 NATIONAL ELECTRICAL CODE AND 2019 CALIFORNIA AMENDMENTS)
4. 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 4, TITLE 24 C.C.R.
   A. (2018 IAPMO UNIFORM MECHANICAL CODE AND 2019 CALIFORNIA AMENDMENTES)
5. 2019 CALIFORNIA PLUMBING CODE (CPC) PART 5, TITLE 24 C.C.R.
   A. (2018 IAPMO UNIFORM PLUMBING CODE AND 2019 CALIFORNIA AMENDMENTS)
6. 2019 CALIFORNIA ENERGY CODE (CEC), PART 6, TITLE 24 C.C.R.
7. 2019 CALIFORNIA FIRE CODE, PART 9, TITLE 24 C.C.R.
   A. (2018 INTERNATIONAL FIRE CODE AND 2019 CALIFORNIA AMENDMENTS)
8. 2019 CALIFORNIA EXISTING BUILDING CODE (CEBC), PART 10, TITLE 24 C.C.R.
   A. (2018 INTERNATIONAL EXISTING BUILDING CODE AND 2019 CALIFORNIA AMENDMENTS)
9. 2019 CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGREEN), PART 11, TITLE 24 C.C.R.
10. 2019 CALIFORNIA REFERENCED STANDARDS CODE, PART 12, TITLE 24 C.C.R.
11. TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS.
12. 2016 ASME A17.1/CSA B44-13 SAFETY CODE FOR ELEVATORS AND ESCALATORS

MEP COMPONENT ANCHORAGE NOTE

ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS. THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2019 CBC, SECTIONS 1617A.1.18 THROUGH 1617A.1.26 AND ASCE 7-16 CHAPTER 13, 26, AND 30:

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G. HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS, OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTIONS EXEPT PLUGS FOR 110/220 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.
3. TEMPORARY, MOVEABLE OR MOBILE EQUIPMENT WHICH IS HEAVIER THAN 400 POUNDS OR HAS A CENTER OF MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT IS REQUIRED TO BE RESTRAINED IN A MANNER APPROVED BY DSA.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE, BUT NEED NOT DEMONSTRATE DESIGN COMPLIANCE WITH THE REFERENCES NOTED ABOVE. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIETED DUCTWORK, PIPING, AND CONDUIT. FLEXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTIONS:

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
B. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR HUNG FROM A WALL.

THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SHALL BE SUBJECT TO THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR STRUCTURAL ENGINEER DELEGATED RESPONSIBILITY AND ACCEPTANCE BY DSA. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH THE ABOVE REQUIREMENTS.

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEM BRACING
PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7-16 SECTION 13.3 AS DEFINED IN ASCE 7-16 SECTION 13.6.5, 13.6.6, 13.6.7, 13.6.8, AND 2019 CBC, SECTIONS 1617A.1.24, 1617A.1.25, AND 1617A.1.26.

THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR IDENTIFIED DISTRUBITON SYSTEM ARE AS NOTED BELOW. WHEN BRACING AND ATTACHMENTS ARE BASED ON A PREAPPROVED INSTALLATION GUIDE (E.G. OSHPD OPM FOR 2013 CBC OR LATER), COPIES OF THE BRACING SYSTEM INSTALLATION GUIDE OR MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF AND DURING THE HANGING AND BRACING OF THE DISTRUBITON SYSTEMS. THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.

MECHANICAL PIPING (MP), MECHANICAL DUCTS(MD), AND PLUMBING PIPING (PP), ELECTRICAL DISTRUBTION SYSTEMS (E):

MP ☐ MD ☐ PP ☐ E ☐ — OPTION 1: DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS

MP ■ MD ■ PP ■ E ■ — OPTION 2: SHALL COMPLY WITH THE APPLICABLE OSHPD PRE-APPROVAL OPM-0052-13, OPM-0043-13, OPM-0203-13.

PLUMBING ABBREVIATIONS

Abbr.	Meaning
ABV	ABOVE
AC	ALTERNATING CURRENT
ACU	AIR-CONDITIONING UNIT(S)
AD	ACCESS DOOR
ADA	AMERICAN WITH DISABILITY ACT
ADAAG	ADA AMERICANS ACCESSIBILITY GUIDELINES
ADDL	ADDITIONAL
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AG	ABOVE THE GROUND
AGA	AMERICAN GAS ASSOCIATION
AHU	AIR-HANDLING UNIT
AIR COND	AIR CONDITION(-ING, -ED)
AISI	AMERICAN IRON AND STEEL INSTITUTE
ALT	ALTERNATE
AMB	AMBIENT
AMP	AMPERE (AMP, AMPS)
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AP	ACCESS PANEL
ARCH	ARCHITECT, ARCHITECTURAL
ARF	ABOVE RAISED FLOOR
ASC	ABOVE SUSPENDED CEILING
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR CONDITIONING ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASPE	AMERICAN SOCIETY OF PLUMBING ENGINEERS
ASSE	AMERICAN SOCIETY OF SANITARY ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
ATM	ATMOSPHERE
AV	ACID VENT
AW	ACID WASTE
AWG	AMERICAN WIRE GAUGE
AWS	AMERICAN WELDING SOCIETY
AWWA	AMERICAN WATER WORKS ASSOCIATION
B&S	BELL AND SPIGOT
BEL	BELOW
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BLDG	BUILDING
BLR	BOILER
BM	BEAM
BOD	BOTTOM OF DUCT
BOM	BILL OF MATERIAL
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BRF	BELOW RAISED FLOOR
BSMT	BASEMENT
BT	BATHTUB
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNITS PER HOUR
BV	BUTTERFLY VALVE
BWV	BACK WATER VALVE
C	DEGREES CELSIUS
CA	COMPRESSED AIR
CAB	CABINET
CAP	CAPACITY
CB	CATCH BASIN
CCT	CIRCUIT
CD	CONDENSATE DRAIN
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CISP	CAST IRON SOIL/SEWER PIPE
CISPI	CAST IRON SOIL PIPE INSTITUTE
CL	CENTERLINE
CLG	CEILING
CMU	CONCRETE MASONRY UNIT
CNTR	CENTER
CO	CLEANOUT
COEF	COEFFICIENT
COL	COLUMN
COM	COMMON
CONC	CONCRETE
CONN	CONNECTION
COND	CONDENS(-ER, -ING, -ATION)
CONST	CONSTRUCTION
CONTR	CONTRACTOR
CP	CIRCULATING PUMP
CS	CAST STEEL
CTR	CENTER
CU	COPPER (CHEMICAL ABBREVIATION)
CU FT	CUBIC FEET
CU IN	CUBIC INCH
CV	CHECK VALVE
CW	COLD WATER
DBL	DOUBLE
DC	DIRECT CURRENT
DCV	DETECTOR CHECK VALVE
DEG	DEGREE
DEMO	DEMOLITION
DEPT	DEPARTMENT
DET	DETAIL
DF	DRINKING FOUNTAIN
DFU	DRAINAGE FIXTURE UNIT
DI	DEIONIZED WATER
DIA	DIAMETER
DIM	DIMENSION
DN	DOWN
DP	DEPTH OR DEEP
DS	DOWNSPOUT
DSP	DRY STANDPIPE
DW	DISTILLED WATER
DWG	DRAWING
DWV	DRAIN, WASTE AND VENT
E	EXISTING
EA	EACH
EFF	EFFICIENCY
ELEC	ELECTRICAL
EMER	EMERGENCY
ENCL	ENCLOSURE
ENG	ENGINEER
ENT	ENTRANCE
EQ	EQUAL
ESS	EMERGENCY SAFETY SHOWER
EEW	EMERGENCY EYEWASH
ESEW	EMERGENCY SHOWER / EYEWASH
EST	ESTIMATE
EVAP	EVAPORAT(-E, -ING, -ED, -OR)
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EWT	ENTERING WATER TEMPERATURE
EXP	EXPOSED
EXT	EXTINGUISH
F	FAHRENHEIT
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FDTH	FIRE DEPARTMENT TEST HEADER
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FINISHED FLOOR
FFE	FINISHED FLOOR ELEVATION
FG	FINISH GRADE
FH	FIRE HOSE
FHC	FIRE HOSE CABINET
FHR	FIRE HOSE RACK
FHS	FIRE HOSE STATION
FHY	FIRE HYDRANT
FIXT	FIXTURE
FLR	FLOOR
FND	FOUNDATION
FP	FIRE PROTECTION MAIN
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FR	FIRE RISER
FS	FLOOR SINK
FT	FEET
FU	FIXTURE UNIT
FURN	FURNISH
FUT	FUTURE
FVC	FIRE VALVE CABINET
FW	FIRE WATER

Abbr.	Meaning
G	NATURAL GAS
GA	GAGE OR GAUGE
GAL	GALLON
GC	GENERAL CONTRACTOR
GCO	GRADE CLEANOUT
GD	GARAGE DRAIN
GI	GREASE INTERCEPTOR
GND	GROUND
GOVT	GOVERNMENT
GP	GALVANIZED PIPE
GPD	GALLONS PER DAY
GPF	GALLONS PER FLUSH
GPM	GALLONS PER MINUTE
GPH	GALLONS PER HOUR
GPS	GALLONS PER SECOND
GV	GALVANIZED
GVA	GATE VALVE
GWH	GAS WATER HEATER
GW	GREASE WASTE
GWW	GRAY WATER WASTE
H	HIGH
HB	HOSE BIB /HYDRANT
HD	HUB DRAIN
HDR	HEADER
HOR	HORIZONTAL
HP	HORSE POWER
HR/HRS	HOUR(S)
HT	HEIGHT
HTG	HEATING
HTR	HEATER
HVAC	HEATING, VENTILATION & AIR CONDITIONING
HW	HOT WATER
HWR	HOT WATER RETURN
HZ	HERTZ (CYCLES PER SECOND)
I	IRON
ICW	INDUSTRIAL COLD WATER
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IHW	INDUSTRIAL HOT WATER
IHWR	INDUSTRIAL HOT WATER RETURN
INC	INCREASER, INCREASING
IN	INCH
INCL	INCLUDE
INFO	INFORMATION
INS	INSULATION
INSP	INSPECT
INSUL	INSULATION
INT	INTERIOR, INTERNAL
INV	INVERT
IP	IRON PIPE
IPS	IRON PIPE SIZE
IW	INDIRECT WASTE
IWH	INSTANTANEOUS WATER HEATER
J-BOX	JUNCTION BOX
JC	JANITOR'S CLOSET
KF	KITCHEN FIXTURE
KW	KILOWATT
KWH	KILOWATT HOUR
KVA	KILOVOLT-AMPERE
KW	KILOWATT
L	LENGTH
LAB	LABORATORY
LAT	LATERAL
LAV	LAVATORY
LBS	POUNDS
LD	LEAK DETECTION
LF	LINEAR FEET
LG	LENGTH
LH	LEFT HAND
LPD	LOW POINT DRAIN
LW	LAB WASTE
LV	LAB VENT
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
ME	MECHANICAL ENGINEER
MECH	MECHANICAL
MFR	MANUFACTURER
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MS	MOP SINK
MTR	MOTOR
MWP	MAXIMUM WORKING PRESSURE
N	NITROGEN
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NFWH	NON-FREEZE WALL HYDRANT
NOM	NOMINAL
NRS	NON RISING STEAM VALVE
N/A	NOT APPLICABLE
NBS	NATIONAL BUREAU OF STANDARDS
NC	NOISE CRITERIA
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIS	NOT IN SCOPE
NO, #	NUMBER
NPS	NOMINAL PIPE SIZE (ALSO CALLED IPS)
NPSHR	NET POSITIVE SUCTION HEAD REQUIRED
NTS	NOT TO SCALE
O	OXYGEN
OC	ON CENTER
ODIA	OUTSIDE DIAMETER
OD	OVERFLOW DRAIN
OSD	OPEN SIGHT DRAIN
OS&Y	OUTSIDE SCREW & YOKE (VALVE)
OUT	OUTLET
OZ	OUNCE
P	PITCH
PB	LEAD (CHEMICAL ABBREVIATION)
PD	PLAZA DRAIN, PRESSURE DROP, OR PRESSURE DIFFERENCIAL
PDI	PLUMBING DRAINAGE INSTITUTE
PE	PROFESSIONAL ENGINEER
PERIM	PERIMETER
PG	PRESSURE GAUGE
PH	PHASE (ELECTRICAL)
PIV	POST INDICATOR VALVE
PL	PROPERTY LINE
PLBG	PLUMBING
POC	POINT OF CONNECTION
PPM	PARTS PER MILLION
PRESS	PRESSURE
PRIM	PRIMARY
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAUGE
PVC	POLYVINYL CHLORIDE
PWS	PURE WATER SUPPLY
PWR	PURE WATER RETURN
PWR	POWER
QT	QUART
QTY	QUANTITY
R	HYDRAULIC RADIUS
RAD	RADIUS
RCP	REFLECTED CEILING PLAN
RCVR	RECEIVER
RD	ROOF DRAIN
RECIRC	RECIRCULATE
REF	REFERENCE
REQD	REQUIRED
RET	RETURN
REV	REVISION
RF	ROOF
RH	RIGHT HAND
RL	ROOF LEADER
RM	ROOM
RO	REVERSE OSMOSIS
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
RPM	REVOLUTIONS PER MINUTE
RW	RAW WATER /RECLAIMED WATER /RECYCLED WATER
RWC	RAIN WATER CONDUCTOR
RWL	RAIN WATER LEADER

Abbr.	Meaning
SAD	SEE ARCHITECTURAL DRAWING(S)
SAN	SANITARY
SB	SPLASH BLOCK
SCD	SEE CIVIL DRAWING(S)
SCFM	CUBIC FT PER MINUTE, STANDARD CONDITIONS
SCFS	CUBIC FT PER SEC, STANDARD CONDITIONS
SCH	SCHEDULE
SCUP	SCUPPER
SD	STORM DRAIN
SE	SEWAGE EJECTOR
SEC	SECOND
SECT	SECTION
SERV	SERVICE
SEV	SEWAGE EJECTOR VENT
SF	SQUARE FOOT
SH	SHOWER
SHT	SHEET
SIM	SIMILAR
SK	SINK
SLV	SLEEVE
SLD	SEE LANDSCAPE ARCHITECT DRAWING(S)
SMD	SEE MECHANICAL DRAWING(S)
SSD	SEE STRUCTURAL DRAWING(S)
SOV	SHUTOFF VALVE
STP	STANDPIPE
SP	STATIC PRESSURE /SPRINKLER /SUMP PUMP
SPEC	SPECIFICATION
SPD	SUMP PUMP DISCHARGE
SPM	SPRINKLER MAIN
SS	SERVICE SINK
STD	STANDARD
STL	STEEL
SUCT	SUCTION
SRV	SAFETY RELIEF VALVE
SQ	SQUARE
SQ FT	SQUARE FEET
S&W	SOIL & WASTE
T	TEE
T&P	TEMPERATURE & PRESSURE RELIEF VALVE
TD	TRENCH DRAIN
TEMP	TEMPERATURE
TLT	TOILET
TW	TEMPERED WATER
TWR	TEMPERED WATER RETURN
TYP	TYPICAL
TAP	TAP, TAPPED
TOT	TAP ON TOP
TP	TRAP SEAL PRIMER
TY	TEE WYE, (SAN TEE)
TYP	TYPICAL
UP	PIPE UP THRU FLOOR SLAB
UR	URINAL
UON	UNLESS OTHERWISE NOTED
V	VENT
VAP	VACUUM PUMP
VT	VOLT
VOL	VOLUME
VAC	VACUUM
VAR	VARIABLE
VB	VALVE BOX
VEL	VELOCITY
VERT	VERTICAL
VLV	VALVE
VOL	VOLUME
VP	VENT PIPE
VS	VENT STACK
VTR	VENT THROUGH ROOF
W	WASTE /WATT
W/	WITH
W/O	WITHOUT
WC	WATER CLOSET
WCO	WALL CLEANOUT
WFS	WATER FLOW SWITCH
WH	WATER HEATER /WALL HYDRANT
WM	WATER METER
WS	WATER STOP
WHA	WATER HAMMER ARRESTOR
WL	WATER LEVEL
WP	WEATHERPROOF
WSFU	WATER SUPPLY FIXTURE UNIT
WT	WEIGHT
%	PERCENT
(E)	EXISTING
(N)	NEW
@	AT (THE RATE OF)
&	AND
#	NUMBER

01 SHEET LIST - PLUMBING

NUMBER	NAME
P0.01	PLUMBING LEGEND, ABBREVIATIONS, AND GENERAL NOTES
P0.02	PLUMBING SCHEDULES AND CALCULATIONS
P1.11	PLUMBING SITE PLAN
P2.01	PLUMBING PLAN - UNDERGROUND - OVERALL
P2.01A	PLUMBING PLAN - UNDERGROUND - SEGMENT A
P2.01B	PLUMBING PLAN - UNDERGROUND - SEGMENT B
P2.11	PLUMBING PLAN - FIRST FLOOR - OVERALL
P2.11A	PLUMBING PLAN - FIRST FLOOR - SEGMENT A
P2.11B	PLUMBING PLAN - FIRST FLOOR - SEGMENT B
P2.21	PLUMBING PLAN - SECOND FLOOR - OVERALL
P2.21A	PLUMBING PLAN - SECOND FLOOR - SEGMENT A
P2.21B	PLUMBING PLAN - SECOND FLOOR - SEGMENT B
P3.00	PLUMBING ENLARGED PLANS
P4.11	PLUMBING ROOF PLAN - OVERALL
P4.11A	PLUMBING ROOF PLAN - SEGMENT A
P4.11B	PLUMBING ROOF PLAN - SEGMENT B
P5.10	DOMESTIC HOT & COLD WATER ISOMETRIC
P5.11	DOMESTIC HOT & COLD WATER ISOMETRIC
P5.20	SANITARY WASTE AND VENT ISOMETRIC
P5.21	SANITARY WASTE AND VENT ISOMETRIC
P5.30	STORM DRAINAGE ISOMETRIC
P6.00	PLUMBING DETAILS
P6.01	PLUMBING DETAILS
P6.02	PLUMBING DETAILS

PLUMBING GENERAL NOTES

1. PROVIDE COMPLETE AND FULLY FUNCTIONAL PLUMBING SYSTEMS AS INDICATED IN THE CONTRACT DOCUMENTS. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE CALIFORNIA PLUMBING CODE, CALIFORNIA MECHANICAL CODE, CALIFORNIA BUILDING CODE AND LOCAL RULES AND REGULATIONS, STATE AND LOCAL FIRE MARSHAL REGULATIONS, THE SAFETY ORDERS OF THE DIVISION OF INDUSTRIAL SAFETY, THE NATIONAL ELECTRIC CODE, THE STANDARDS OF THE NATIONAL FIRE PROTECTION ASSOCIATION, AMERICAN GAS ASSOCIATION, OCCUPATION AND SAFETY ACT, AMERICAN NATIONAL STANDARDS INSTITUTE, AMERICAN SOCIETY OF MECHANICAL ENGINEERS, AMERICAN SOCIETY FOR TESTING AND MATERIALS, INSTALLATION STANDARDS PUBLISHED BY THE INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS (IAPMO) AND OTHER APPLICABLE LAWS, CODES, OR REGULATIONS. NOTHING IN THESE CONTRACT DOCUMENTS SHALL BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES.
2. VERIFY LOCATION OF UTILITIES PRIOR TO PERFORMING WORK. COORDINATE ALL WORK WITH OTHER TRADES.
3. PLUMBING FIXTURES SHALL HAVE MAXIMUM FLOW RATES AS INDICATED ON SCHEDULES.
4. SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS, MOUNTING HEIGHTS AND COLOR OF PLUMBING FIXTURES.
5. COORDINATE ALL CORING OF FLOORS AND WALLS WITH ARCHITECT PRIOR TO START OF WORK.
6. BEFORE FABRICATION OR INSTALLATION, THE CONTRACTOR SHALL VERIFY EXACT LOCATIONS OF ALL MECHANICAL EQUIPMENT. EXACT ROUGH-IN LOCATIONS AND REQUIREMENTS SHALL BE COORDINATED IN FIELD.
7. PIPING SHALL HAVE SUFFICIENT CLEARANCE FROM STRUCTURE TO ALLOW FOR EXPANSION AND CONTRACTION OF THE PIPING. NO PIPING SHALL TOUCH WOOD, CONCRETE, OTHER PIPING, ETC.
8. ALL EQUIPMENT, FIXTURES, ETC. SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS.
9. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, AND EQUIPMENT NECESSARY AND PERFORM ALL REQUIRED TESTING OF ALL PIPING AND ACCESSORIES INSTALLED. ALL SUCH PLUMBING INSTALLATIONS SHALL BE TESTED, REPAIRED, AND ADJUSTED TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE AND ALL GOVERNING AUTHORITIES.
10. ALL VALVES, UNIONS, ETC. SHALL BE SAME SIZE AS LINE SIZE UNLESS OTHERWISE NOTED ON DRAWINGS.
11. PROVIDE UNIONS AFTER EACH THREADED VALVE AND PRIOR TO EQUIPMENT CONNECTIONS.
12. FOLLOW THE GENERAL ARRANGEMENT INDICATED ON THE DRAWINGS AS CLOSELY AS POSSIBLE, THE CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, ELECTRICAL AND ALL OTHER TRADES PRIOR TO INSTALLATION OF THE MATERIALS AND EQUIPMENT TO VERIFY ADEQUATE SPACE AVAILABLE FOR INSTALLATION OF THE WORK SHOWN. THE ARCHITECT AND ENGINEER SHALL BE IMMEDIATELY NOTIFIED IF AN AREA OF CONFLICT OCCURS BETWEEN TRADES.
13. SPECIFICATIONS ARE AN INTEGRAL PART OF THIS PROJECT. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH SPECIFICATION REQUIREMENTS.
14. ALL FIXTURES, FLOOR DRAINS, FLOOR SINKS, ETC. SHALL BE TRAPPED AND VENTED. PROVIDE TRAP PRIMER TO ALL FLOOR DRAINS, FLOOR SINKS, HUB DRAINS AND AS INDICATED ON THE DRAWINGS. ALL TRAP PRIMERS SHALL BE ACCESSIBLE AND PROVIDED WITH A 12"X12" ACCESS PANEL (MINIMUM).
15. NOT USED (2)
16. PROVIDE ALL PIPING, VALVES, FITTINGS AND OTHER APPURTENANCES FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.
17. PIPING TO BE SLOPED AS FOLLOWS UNLESS OTHERWISE NOTED:
    A. SANITARY SEWER = 2%
    B. SANITARY VENT (BELOW FLOOD RIM) = 0%
    C. SANITARY VENT (ABOVE FLOOD RIM) = 0.25%
    D. TRAP PRIMER = 1%
    E. CONDENSATE = 1%
    F. STORM DRAIN = 1%
18. VERIFY IN FIELD EXISTING CONDITIONS, SIZE AND EXACT LOCATION OF SERVICES PRIOR TO START OF WORK.
19. THE CONSTRUCTION DOCUMENTS FOR THIS PROJECT WERE PREPARED BY THE DESIGN TEAM USING 3-D MODELING SOFTWARE. USING THIS SOFTWARE BY THE DESIGN TEAM DOES NOT RELIEVE THE CONTRACTOR FROM PERFORMING THE NECESSARY COORDINATION TO PROVIDE COMPLETE, CODE COMPLIANT AND OPERATIONAL BUILDING SYSTEMS. THE PLANS AND SECTIONS PROVIDED ARE NOT COMPLETE AND ARE TO BE CONSIDERED DIAGRAMMATIC ONLY. THE EXACT LOCATION OF THE PIPING, DUCTWORK, ELECTRICAL AND SUPPORT COMPONENTS ARE TO BE DETERMINED IN THE FIELD. ALL BUILDING SECTIONS AND DETAILS PROVIDED ARE FOR INFORMATION ONLY AND DO NOT RELIEVE THE CONTRACTOR FROM PERFORMING FINAL COORDINATION. CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH ALL OTHER TRADES.
20. SUBMIT FOR APPROVAL MANUFACTURER'S SUBMITTAL DATA ON ALL MATERIALS, EQUIPMENT, AND DEVICES PER SPECIFICATIONS

FIRE PROTECTION GENERAL NOTES:

1. REFER TO SPECIFICATIONS FOR MATERIALS, METHODS OF CONSTRUCTION AND ADDITIONAL INFORMATION.
2. WORK INCLUDES DESIGN AND INSTALLATION OF A COMPLETE FIRE PROTECTION SYSTEM FOR THE FACILITY BASED ON A DESIGN BUILD BASIS. CONTRACTION IS RESPONSIBLE FOR ALL WORK, INCLUDING SHOP DRAWINGS PREPARATION, NECESSARY FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.
3. PERFORM ALL DESIGN AND INSTALLATION WORK IN ACCORDANCE WITH THE LATEST ADOPTED EDITION OF NFPA, ALL GOVERNING BUILDING CODES, REGULATIONS, ORDINANCES AND AGENCIES, DRAWINGS AND SPECIFICATIONS.
4. SUBMIT COMPLETE FIRE PROTECTION SYSTEM AND FIRE & LIFE SAFETY PLAN CHECK DOCUMENTS FOR REVIEW AND APPROVAL BY LOCAL FIRE MARSHAL, OR AHJ PRIOR TO INSTALLATION.
5. PROVIDE CALIFORNIA LICENSED FIRE PROTECTION ENGINEER'S STAMP, OR CONTRACTOR'S C-16 LICENSE ON FIRE PROTECTION PLAN(S) FOR DSA AND FIRE MARSHAL REVIEW AND APPROVAL.
6. ALL COST FOR INSPECTION, TEST SERVICES, BUILDING PERMITS, LICENSES AND CERTIFICATES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR UNLESS NOTED OTHERWISE IN THE SPECIFICATIONS.
7. PROVIDE HANGERS AND SWAY BRACING AS REQUIRED PER THE LATEST ADOPTED EDITION OF NFPA 13, SPECIFICATION AND LOCAL CODES AND ORDINANCES.
8. ELEVATIONS OF PIPING AND POINTS OF CONNECTION ABOVE AND BELOW GROUND SHALL BE VERIFIED BY FIELD MEASUREMENT PRIOR TO THE START OF INSTALLATION.
9. COORDINATE THE LOCATION OF RISERS, PIPING AND OTHER SPRINKLER SYSTEMS COMPONENTS WITH ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL TRADES.
10. COORDINATE INSTALLATION OF ALL EQUIPMENT AND PIPING WITH OTHER TRADES PRIOR TO INSTALLATION. CONTRACTOR SHALL COORDINATE EXACT LOCATION OF ACCESS PANELS AND SPRINKLER HEADS PRIOR TO INSTALLATION.
11. AVOID PENETRATION OF SOUND-RATED FLOORS AND WALLS WHENEVER POSSIBLE. IF PENETRATIONS ARE REQUIRED, REFER TO ACOUSTIC CONSULTANT REQUIREMENTS FOR PROPER INSTALLATION.
12. ALL PENETRATIONS OF WALLS, FLOORS AND CEILINGS TO BE SEALED ON BOTH SIDES WITH RATED FIRE STOPPING MATERIALS AND ACOUSTICAL SEALANT IN ORDER TO MAINTAIN THE INTEGRITY OF THE WALL AND AVOID TRANSMISSION OF SOUND. REFER TO ACOUSTIC CONSULTANT CONTRACT DOCUMENTS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
13. CONTRACTOR SHALL OBTAIN HYDRANT FLOW TEST CONDUCTED WITHIN THE LAST SIX (6) MONTHS TO DETERMINE AVAILABLE FLOW AND PRESSURE AT THE SITE.
14. FIRE SPRINKLER SYSTEM SHALL BE HYDRAULICALLY CALCULATED IN ACCORDANCE WITH THE LATEST ADOPTED EDITION OF NFPA 13.
15. FIRE SPRINKLER CONTRACTOR SHALL DETERMINE APPROPRIATE LOCATIONS TO TERMINATE FIRE SPRINKLER DRAINS. DRAIN LOCATIONS SHALL COMPLY WITH ALL CODES AND SHALL BE APPROVED BY THE AUTHORITY HAVING JURISDICTION. FIRE SPRINKLER CONTRACTOR SHALL SHOW DRAIN TERMINATION ON SHOP DRAWINGS. COORDINATE INDIRECT WASTE RECEPTOR LOCATIONS WITH PLUMBING CONTRACTOR TO ACCEPT DRAIN DISCHARGE TERMINATION.
16. SPRINKLER HEADS INSTALLED IN FREEZING CONDITIONS SHALL BE PROTECTED FROM FREEZING.
17. FIRE PROTECTION SYSTEM PIPING AND EQUIPMENT SHALL BE SUPPORTED AND SEISMICALLY BRACED PER CBC, ASCE 7 AND NFPA REQUIREMENTS.

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

Chaffey College

HMC Architects
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3546 CONCOURS STREET
ONTARIO, CA 91764
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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	02.11.2022

KEYNOTES

LEGENDS

CONSULTANT

INTEGRAL
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FACILITY:
**CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710**

PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
PLUMBING LEGEND, ABBREVIATIONS, AND GENERAL NOTES

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722
DATE: 01.19.2022 | CLIENT PROJ NO:

SHEET:
P0.01

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PLEASE RECYCLE

PIPE MATERIAL SCHEDULE

PLUMBING SERVICE	MATERIAL	COPPER TYPE 'L', ASTM B88, B32 FITTINGS, ASME B16.18, B16.22, B16.24	COPPER TYPE "M" (SOLDERED)	COPPER TYPE 'K', ASTM B88, B32 FITTINGS, ASME B16.18, B16.22, B16.24	HUBLESS, CAST IRON SOIL PIPE CISPI HUBLESS COUPLINGS WITH NFS CERTIFICATION	HUBLESS, CAST IRON SOIL PIPE, ASTM C564 HEAVY DUTY, SHEILDED STAINLESS STEEL COUPLING	SCHEDULE 40 BLACK STEEL PIPE & FITTINGS	EPOXY-COATED BLACK STEEL SCHEDULE 40 ASTM A53 PIPE & FITTINGS	REMARKS
SANITARY WASTE & VENT	ABOVE GRADE				■				
	BELOW GRADE					■			PROVIDE CORROSION PROTECTION PER ASTM A674 OR AWWA C105
STORM DRAIN	ABOVE GRADE				■				
	BELOW GRADE					■			PROVIDE CORROSION PROTECTION PER ASTM A674 OR AWWA C105
CONDENSATE & INDIRECT DRAIN	ABOVE GRADE		■						
DOMESTIC COLD & HOT WATER	ABOVE GRADE	■							
	BELOW GRADE			■					PROVIDE CORROSION PROTECTION PER ASTM A674 OR AWWA C105
FIRE PROTECTION	ABOVE GRADE						■		
	BELOW GRADE							■	

PLUMBING FIXTURES CALCULATION

Fixture type	No. of fixtures	Fixture Units (DFU)	Total SAN DFU	Fixture Unit (WSFU)	CWSFU (75%)	HWSFU (75%)	CWSFU Total	HWSFU Total
WC	18	3	54	5	5	0	90	0
UR	3	2	6	4	4	0	12	0
LAV	14	1	14	1	0.75	0.75	10.5	10.5
MOP SINK	3	3	9	3	2.25	2.25	6.75	6.75
SINK+DW	1	2	2	1.5	1.125	2.625	1.125	2.625
EWC	2	1	2	0.5	0.5	0	1	0
FLOOR DRAIN	12	2	24	0				
FLOOR SINK	2	3	6	0				
HUB DRAIN	1	8	8	0				
TOTAL:			125				121.4	19.9
TOTAL:							141.25	

PROJECT NAME: CHAFFEY COLLEGE — **SHEET 1 OF 1**
SYSTEM: DOMESTIC WATER CALCULATION
BY: Integral Group — **DATE 7/2/2020**

A	WATER PRESSURE:	MAX: 70 PSI / MIN: 60 PSI				
B	SYSTEM FU'S	TOTAL FU 142 FU / FLUSH VALVE X	FLUSH TANK	=	78	GPM
C	CONT. FLOW GPM (HVAC)			=	10	GPM
D	TOTAL SYSTEM GPM			=	88	GPM
E	PRV (MAKE/MODEL)	SIZE: 2" Inch				
F	METER SIZE:	2"	LOSS AT PEAK FLOW	=	2.6	PSI
G	MINIMUM AVAILABLE SYSTEM PRESSURE (OR PRV SET PRESSURE)			=	57.4	PSI
H	RESIDUAL PRESSURE REQUIRED AT REMOTE OUTLET			=	25	PSI
I	ELEVATION LOSS =	25 FT. X	0.433	=	10.8	PSI
J	PRV LOSS (FALL OFF PRESSURE)			=	0	PSI
K	ADDITIONAL BACKFLOW PREVENTER LOSS			=	12	PSI
L	MISCELLANEOUS PRESSURE LOSS			=	0	PSI
M	TOTAL SYSTEM LOSSES (H+I+J+K+L)			=	47.825	PSI
N	PRESSURE AVAILABLE FOR FRICTION LOSS (G-M)			=	9.6	PSI
O	DEVELOPED LENGTH:	200	FT. PLUS 10% FOR FITTINGS	=	220	PSI
P	MAX. FRICITION LOSS PER 100 FEET =	(N) 9.6 / (O) 220	X 100	=	4.4	PSI

PIPE SIZING SCHEDULE

SIZE	GPM	FLUSH TANK	FLUSH VALVE
1/2"	2	1	-
3/4"	5	6	-
1"	10	13	-
1-1/4"	17	24	-
1-1/2"	27	47	12
2"	56	155	76
2-1/2"	86	305	126
3"	140	585	430
4"	217	1070	1067
MAX. DESIGN VELOCITY =			8 FPS
FRICTION LOSS PER 100 FT.			4 PSI

PIPE SIZING SCHEDULE

SIZE	GPM	FLUSH TANK	FLUSH VALVE
1/2"	2	1	-
3/4"	4	5	-
1"	10	13	-
1-1/4"	17	24	-
1-1/2"	27	47	10
2"	48	120	44
2-1/2"	74	246	124
3"	106	412	276
4"	186	851	824
MAX. DESIGN VELOCITY =			5 FPS
FRICTION LOSS PER 100 FT.			4 PSI

PLUMBING FIXTURE COUNT AND CONNECTION SCHEDULE

SYMBOL	DESCRIPTION	MANUFACTURER	MODEL No.	CONNECTION SAN	VENT	CW	HW	WATER SUPPLY FIXTURE UNIT (WSFU) FU	DRAINAGE FIXTURE UNIT (DFU) FU	NOTES
WC-1	FLUSH VALVE WATER CLOSET	AMERICAN STANDARD	AFWALL MILLENNIUM FLOWISE	3"	2"	1.5"	-	5.0	4.0	FLUSH VALVE SLOAN ROYAL III (MANUAL OPERATION)
WC-2	FLUSH VALVE WATER CLOSET (ADA)	AMERICAN STANDARD	AFWALL MILLENNIUM FLOWISE	3"	2"	1.5"	-	5.0	4.0	FLUSH VALVE SLOAN ROYAL III (MANUAL OPERATION)
UR-1	URINAL (ADA)	AMERICAN STANDARD	PINTBROOK	2"	2"	1"	-	0.0	4.0	FLUSH VALVE SLOAN ROYAL 186 (MANUAL OPERATION)
L-1	LAVATORY	AMERICAN STANDARD	LUCERNE	2"	1 1/2"	1/2"	1/2"	1.0	1.0	FAUCET, CHICAGO FAUCET 3400 (MANUAL OPERATION)
L-2	LAVATORY (ADA)	AMERICAN STANDARD	LUCERNE	2"	1 1/2"	1/2"	1/2"	1.0	1.0	FAUCET, CHICAGO FAUCET 3400 (MANUAL OPERATION)
SK-1	KITCHEN SINK	ELKAY	LRAD252255	2"	1 1/2"	3/4"	3/4"	1.5	2.0	FAUCET, CHICAGO FAUCET 10" HIGH SPOUT, 8" REACH
SK-2	SINK	ELKAY	LRAD252255	2"	1 1/2"	3/4"	3/4"	1.5	2.0	FAUCET, CHICAGO FAUCET 10" HIGH SPOUT, 8" REACH
MB-1	ENAMELED CAST IRON MOP SINK	AMERICAN STANDARD	FLOORWELL	3"	2"	3/4"	3/4"	3.0	3.0	FAUCET, CHICAGO FAUCET No. 897-CCP
DF-1	BILEVEL ELECTRIC WATER COOLER WITH BOTTLE FILLING STATION	ELKAY	EMABFTL8WSSK	2"	1 1/2"	1/2"	-	0.5	0.5	PROVIDE WITHOUT FILTER (120V/60 Hz, 6 FLA)
HB-1	HOSE-BIBB	JAY R. SMITH		-	-	3/4"	-	2.5	-	
	TOTAL									

NOTES:
1. WATER SIZING IS BASED ON FLUSH VALVE TYPE WATER CLOSET.
2. NEW DRAINAGE FIXTURE UNITS @ 1/4" SLOPE = MULTIPLE 4" LATERAL (CPC TABLE 7-3 AND 7-5)

EXPANSION TANKS

MARK	MANUFACTURER	MODEL	LOCATION	SERVICE	CAPACITY (GALLONS)	SIZE DIA.	SIZE HT.	PRESSURE INITIAL	PRESSURE FINAL	CONNECTION	NOTES
ET-1	AMTROL	ST-5-C	CUST.	DOMESTIC HOT WATER	2.1	10"	10"	80 PSIG	55 PSIG	1/2"	

NOTES:
1. PROVIDE PRECHARGED STEEL HYDRO-PNEUMATIC TANK WITH ASME REPLACEABLE HEAVY DUTY BUTYL RUBBER BLADDER

DRAIN, CLEANOUT AND ACCESSORY SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	MODEL	STRAINER TYPE	NOTES
FD-1	RESTROOM FLOOR DRAIN	J.R. SMITH	2005Y	5" DIA. SQUARE TOP	CAST IRON BODY WITH STAINLESS STEEL SQUARE TOP, 1/4" MAXIMUM GRATE OPENING
FD-2	MECHANICAL ROOM FLOOR DRAIN	J.R. SMITH	2230Y	12" DIA. TOP	CAST IRON BODY AND GRATE, 1/4" MAXIMUM GRATE OPENING
FS-1	MECHANICAL ROOM FLOOR SINK	J.R. SMITH	-	-	-
PD-1	PLANTER DRAIN	J.R. SMITH	2675		
PD-2	PLANTER DRAIN - SCUPPER DRAIN	J.R. SMITH	9685		PROVIDE WITH PROTECTIVE STAINLESS STEEL MESH FOR PANTING AREA INSTALLATION
DSN-1	DOWNSPOUT COVER WITH HINGED PERFORATED COVER	J.R. SMITH	1775	-	304 STAINLESS STEEL
FCO	FLOOR CLEANOUT	J.R. SMITH	4020	-	CAST IRON CLEANOUT.
GCO	GROUND CLEANOUT	J.R. SMITH	4240	-	CAST IRON CLEANOUT WITH TRACTOR COVER.
VTR ACCESSORY	VENT CAP	JOSAM	26700	-	VENT PIPE SECURING SCREW.
TP-1	TRAP SEAL PRIMER	ZURN	Z1022	-	PROVIDE BRONZE BODY WITH INTEGRAL VACUUM BREAKER SANI-GUARD AUTOMATIC TRAP PRIMER WITH DISTRIBUTION UNIT Z1022-DU2 - Z1022-DU4
TP-2	ELECTRONIC TRAP PRIMER	PLUMBING PRECISION PRODUCTS	MPB-500	-	PROVIDE ACCESS PANEL AND 120V ELECTRICAL POWER
TMV-1	DOMESTIC THEMOSTATIC MIXING VALVE	LAWLER	61-25	-	-
TMV-2	DOMESTIC THEMOSTATIC MIXING VALVE	BRADLEY	S59-4000	-	-
RR-1	ROOF RECEPTOR	J.R. SMITH	3970Y-UDC	-	-
RD/OD-1	COMBINATION ROOF DRAIN / OVERFLOW DRAIN	J.R. SMITH	1850Y-CID	CAST IRON DOME	-
HB-1	WALL MOUNTED HOSE BIB	J.R. SMITH	5509QT	-	LOCKABLE WALL MOUNTED EXPOSED HOSE BIB

RECIRCULATION PUMP SCHEDULE

MARK	MANUFACTURER	MODEL	LOCATION	SERVICE	PUMP GPM	PUMP HEAD (FT)	MOTOR RPM	MOTOR HP	ELEC. V/Ph/Hz	NOTES
CP-1	GRUNDFOS	UPS-26-99-BUAC/T	CUST.	HOT WATER RETURN	5	20		1/6	120/1/60	

NOTES:
1. PUMP SHALL BE IN-LINE WET ROTOR TYPE AND BRONZE CONSTRUCTION.
2. PROVIDE REMOTE TRANSMITTER/RECEIVER AND HARD WIRED MOTION SENSOR IN EACH RESTROOM AND AT EACH BREAKROOM SINK

AIR-TO-WATER HEAT PUMP WATER HEATER SCHEDULE

MARK	TYPE	MANUFACTURER	MODEL	LOCATION	SERVICE	NOMINAL CAPACITY	1ST HOUR RATING	RECOVERY RATE @ 80 DEG.F TEMP. RISE	# OF ELEMENTS	ELECTRICAL HEATING CAPACITY	RATED HEAT PUMP POWER	POWER	MOC	WEIGHT	NOTES
DHE-1	HYBRID	A.O.SMITH	HPTU-80	CUST.	DOMESTIC WATER	80	95	113 GPH	2	4.5 KW	6 HP	208V/60/1	30 A	931 LBS	NOTE 1,2

NOTES:
1. INSTALL HEAT EXCHANGERS PER MANUFACTURER'S RECOMMENDATIONS/INSTRUCTIONS.
2. REFRIGERANT - R134A
3. EFFICIENCY: HYBRID MODE - 90%; ELECTRIC MODE - 50%

AGENCY APPROVAL:

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2	ADDENDUM 2	02.11.2022

KEYNOTES

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PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
PLUMBING SCHEDULES AND CALCULATIONS

ADDENDUM #2

FILE NO.: 36-C1 — A# : 04-119722

DATE: 01.19.2022 — CLIENT PROJ NO:

SHEET:

P0.02

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ELECTRICAL SYMBOLS AND LEGEND

EXISTING / DEMOLITION

- EXISTING EQUIPMENT / RACEWAYS TO REMAIN
- EXISTING EQUIPMENT / RACEWAYS TO BE REMOVED
- NEW EQUIPMENT / RACEWAYS
- EXISTING TO REMAIN
- EXISTING TO BE REMOVED
- NEW EQUIPMENT, LIGHTING FIXTURE OR DEVICE

SINGLE LINE DIAGRAM

- TRANSFORMER , AS NOTED ON SINGLE LINE DIAGRAM
- TRANSFORMER , AS NOTED ON SINGLE LINE DIAGRAM
- CIRCUIT BREAKER, 3 POLE UNLESS NOTED OTHERWISE
- MOTOR STARTER WITH OVERCURRENT PROTECTION, 3 POLE UNLESS NOTED OTHERWISE
- MOTOR STARTER WITH FUSED AND DISCONNECT SWITCH, 3 POLE UNLESS NOTED OTHERWISE
- G — GROUND FAULT RELAY
- S — SHUNT TRIP RELAY
- DRAW-OUT CIRCUIT BREAKER
- NON-FUSED DISCONNECT SWITCH, 30 AMP, 3P UNLESS NOTED OTHERWISE
- FUSED DISCONNECT SWITCH, 3 POLE UNLESS NOTED OTHERWISE
- M — DEMAND TYPE KWH METER
- M — DEMAND TYPE KWH METER WITH ENCLOSURE
- M — PROVISION FOR UTILITY COMPANY KWH METER
- K — KIRK-KEY INTERLOCK BETWEEN DEVICES
- CURRENT TRANSFORMER (CT)
- AM — AMMETER
- IQ — ELECTRONIC METER
- SEPARABLE CONNECTOR(S)
- GROUND
- SURGE PROTECTIVE DEVICE

GROUNDING SYSTEM

FLOOR	WALL	
✚	✚	GROUND PLATE, FLAT TAPPED SIDE TO BE FLUSH WITH FURNISHED SURFACE. CADWELD B164-2Q OR EQUIVALENT
G	G	GROUND BUS
TG	TG	TECHNICAL GROUND BUS
⊙		GROUND ROD
⊗		GROUND ROD TEST WELL
		EXOTHERMIC GROUND CONNECTION
	—G—	GROUND WIRE

RECEPTACLES / POWER

POKE THRU	FLOOR	WALL	CEILING	
		(18)		MULTI-OUTLET RACEWAY WITH PREWIRED RECEPTACLES MOUNTED 12" ON CENTER UNLESS OTHERWISE NOTED. NUMBER IN (X) PARENTHESIS INDICATES DISTANCE BETWEEN DEVICES. WHERE MULTIPLE CIRCUITS ARE INDICATED CIRCUITS ALTERNATE ALONG ENTIRE LENGTH OF RACEWAY
				SIMPLEX RECEPTACLES
				DUPLEX RECEPTACLES
				QUADRUPLEX RECEPTACLES
	X	X	X	SPECIAL RECEPTACLES (DUPLEX & QUADRUPLEX), REFER TO SPECIAL RECEPTACLE SCHEDULE, THIS SHEET
	X	X	X	
				GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLES
				ABOVE COUNTER RECEPTACLES. INSTALL ABOVE COUNTER OR DEFINED HEIGHT
				HALF CONTROLLED DUPLEX
				HALF CONTROLLED QUADRUPLEX
				SWITCHED RECEPTACLES
				CLOCK RECEPTACLES
		J	J	JUNCTION BOX 4" SQUARE MINIMUM FOR WALL OR CEILING MOUNTED
		J	J	JUNCTION BOX SIZE AS REQUIRED FOR NUMBER OF WIRES OR RACEWAYS
		P	P	SYSTEM FURNITURE POWER FEED. SIMILAR TO WIREMOLD EVOLUTION SERIES EPSF 2

NOTE: ALL RECEPTACLE OUTLETS ON WALLS ARE MOUNTED AT 18" AFF TO CENTER OF DEVICE, UON.

LETTER	RATING	NEMA	SPECIAL RECEPTACLE DESCRIPTION SCHEDULE NOTE: NUMBER OF WIRES INCLUDE GROUND
A	125V, 1Ø, 30A, 2P, 3W	5-30R	WITH 5-30P PLUG
B	125V, 1Ø, 50A, 2P, 3W	5-50R	WITH 5-50P PLUG
D	125/250V, 1Ø, 20A, 3P, 4W	14-20R	WITH 14-20P PLUG
F	125/250V, 1Ø, 30A, 3P, 4W	14-30R	WITH 14-30P PLUG
J	250V, 1Ø, 20A, 2P, 3W	6-20R	WITH 6-20P PLUG
K	250V, 1Ø, 30A, 2P, 3W	6-30R	WITH 6-30P PLUG
L	-	-	'L' INDICATES ASSOCIATED RECEPTACLE IS LOCKING TYPE, PROVIDE MATCHING PLUG FOR EACH RECEPTACLE
M	250V, 1Ø, 50A, 2P, 3W	6-50R	WITH 6-50P PLUG
N	250V, 3Ø, 20A, 3P, 4W	15-20R	WITH 15-20P PLUG
P	250V, 3Ø, 30A, 3P, 4W	15-30R	WITH 15-30P PLUG
R	250V, 3Ø, 50A, 3P, 4W	15-50R	WITH 15-50P PLUG
S	480V, 3Ø, 30A, 3P, 4W	L16-30R	WITH L12-30P PLUG
T	125V, 1Ø, 20A, 2P, 3W	5-20R	ISOLATED GROUND WITH DEDICATED GREEN/YELLOW CONDUCTOR BACK TO GROUND BUS AT PANEL
X	125V, 1Ø, 20A, 2P, 3W	5-20R	WITH 5-20P PLUG
Z	480V, 3Ø, 20A, 3P, 4W	L16-20R	DEDICATED CIRCUIT WITH L16-20R PLUG

NUMBER OF CONDUCTORS AND CONDUIT SIZE

3#12,3/4"C	8 2#8,1#10G,3/4"C
4#12,3/4"C	8 3#8,1#10G,3/4"C
5#12,3/4"C	8 4#8,1#10G,3/4"C
6#12,3/4"C	8 5#8,1#10G,1"C
7#12,3/4"C	8 6#8,1#10G,1"C
8#12,3/4"C	8 7#8,1#10G,1"C
9#12,3/4"C	8 8#8,1#10G,1½"C
3#10,3/4"C	6 2#6,1#10G,3/4"C
4#10,3/4"C	6 3#6,1#10G,1"C
5#10,3/4"C	6 4#6,1#10G,1"C
6#10,3/4"C	6 5#6,1#10G,1"C
7#10,3/4"C	6 6#6,1#10G,1½"C
8#10,1"C	6 7#6,1#10G,1½"C
9#10,3/4"C	6 8#6,1#10G,1½"C

CONDUCTOR COUNT INCLUDES GROUNDING AND NEUTRAL CONDUCTORS THAT ARE NOT INDICATED IN THE HATCH COUNT. CONDUIT SIZES ARE BASED UPON COPPER CONDUCTORS MINIMUM AND MAY BE INCREASED AT CONTRACTORS OPTION FOR LONG OR DIFFICULT RUNS.

LIGHTING

WALL	CEILING	
		RECESSED MOUNTED TROFFER
		SURFACE MOUNTED TROFFER
		SUSPENDED OR PENDANT MOUNTED LUMINAIRE
		STRIP OR TRACK LIGHT
		SURFACE MOUNTED DOWNLIGHT
		RECESSED MOUNTED DOWNLIGHT
		PENDANT MOUNTED DOWNLIGHT
		WALL MOUNTED LUMINAIRE
		DIRECTIONAL LUMINAIRE
		POLE MOUNT FIXTURES (1, 2, 3, 4 HEADS)
EXIT		EXIT SIGN; SHADED PORTION INDICATES ILLUMINATED FACE. DIRECTIONAL ARROWS AS INDICATED ON PLANS. PROVIDE MASTER/SLAVE HIGH AND LOW LEVEL EXIT SIGNS WHEREVER AN EXIT SIGN IS INDICATED ON PLANS
TRACK		
LED		
MULTIPLES		
UNDERWATER		

NOTES:

A. CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING FIXTURE TYPE AND MOUNTING CONDITIONS REGARDLESS OF SYMBOL USED ON PLANS.
B. REFER TO FIXTURE SCHEDULE FOR FIXTURE DESCRIPTION, MOUNTING AND LAMP INFORMATION. SHADED FIXTURE SYMBOLS INDICATE FIXTURE IS CONNECTED TO THE LIFE SAFETY SYSTEM OR HAS SECONDARY POWER SOURCE.

EXAMPLES: NORMAL, EMERGENCY, NORMAL, EMERGENCY

LUMINAIRE NOMENCLATURE: A 3,a,z1 — "A" DENOTES FIXTURE TYPE; "3" DENOTES CIRCUIT NUMBER; "a" DENOTES SWITCH ZONE; "z1" DENOTES DAYLIGHT ZONE; "r1" DENOTES SITE RELAY ZONE

SWITCHING

WALL	CEILING	
S M		MANUAL MOTOR STARTER WITH THERMAL OVERLOAD NUMBER OF POLES AS REQUIRED
S X		SWITCH, SUBSCRIPT INDICATES: X = NONE - SINGLE POLE X = 3 - THREE WAY X = A,B,C - OUTLET CONTROLLED X = 2 - DOUBLE POLE X = KP - KEY OPERATED WITH PILOT LIGHT X = P - PILOT LIGHT X = R - MOMENTARY RELAY ON/OFF
S ab		2-SINGLE POLE SWITCHES, UNDER COMMON PLATE, + 42" UON
S abc		3-SINGLE POLE SWITCHES, UNDER COMMON PLATE, + 42" UON
X33 S L abc		LOW VOLTAGE LIGHTING CONTROL. NUMBER IN ELONGATED HEXAGON INDICATES CONTROL IDENTIFICATION. REFER TO SEQUENCE OF OPERATIONS AND LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION
S LX		LOW VOLTAGE LIGHTING CONTROL SUBSCRIPT INDICATES: X = D - DIMMER SWITCH X = S - SENSOR SWITCH X = T - TIMER SWITCH X = M - LOW VOLTAGE MASTER CONTROL SWITCH
		DIMMER WITH INTEGRAL SWITCH, +42" UON. '600' INDICATES RATING IN WATTS
		ROOM TYPE OCCUPANCY SENSOR, ARROW INDICATES DIRECTION OR ORIENTATION, SUBSCRIPT INDICATES SWITCH LEG OR CIRCUIT TO BE CONTROLLED
		ROOM TYPE OCCUPANCY SENSOR, ARROW INDICATES DIRECTION OR ORIENTATION, SUBSCRIPT INDICATES SWITCH LEG OR CIRCUIT TO BE CONTROLLED
		CORRIDOR TYPE OCCUPANCY SENSOR, ARROW INDICATES DIRECTION OR ORIENTATION, SUBSCRIPT INDICATES SWITCH LEG OR CIRCUIT TO BE CONTROLLED
X		SENSOR TYPE SUBSCRIPT INDICATES: X = DT - DUAL TECHNOLOGY X = H - HALLWAY X = HB - HIGH BAY X = IR - PASSIVE INFRARED X = US - ULTRASONIC
		PUSH-BUTTON STATION. +42" UON
		PHOTOSENSOR - WALL MOUNT WITH DIRECTIONAL VIEW. ARROW INDICATES AIMING DIRECTION
	P	PHOTOSENSOR - CEILING MOUNT WITH DIRECTIONAL VIEW. ARROW INDICATES AIMING DIRECTION
	P	PHOTOSENSOR - CEILING MOUNT WITH 360 VIEW
	RC	ROOM CONTROLLER - CEILING MOUNT
	ER	EMERGENCY RELAY - CEILING MOUNT
	PL	PLUG LOAD CONTROLLER

FIRE ALARM SYSTEM

WALL	CEILING	
	H	HEAT DETECTOR
	H X	HEAT DETECTOR SUBSCRIPT INDICATES: X = C - ABOVE CEILING X = F - BELOW FLOOR
	S	SMOKE DETECTOR
	S X	SMOKE DETECTOR SUBSCRIPT INDICATES: X = C - ABOVE CEILING X = F - BELOW FLOOR X = D - DUCT
S		MANUAL PULL STATION
F	F	STROBE
F	F	HORN/STROBE
F	F	HORN
F WP		HORN - WEATHER PROOF, VANDAL RESISTANT
F	F	BELL
FACP		FIRE ALARM CONTROL PANEL
RNPS		REMOTE NOTIFICATION POWER SUPPLY
FATC		FIRE ALARM TERMINAL CABINET
EOL		END OF LINE RESISTOR
RA		REMOTE ANNUNCIATOR
SD		SMOKE DAMPER
MD		MAGNETIC DOOR HOLDER
AM		ADDRESSABLE MODULE
RM		RELAY MODULE
WFS		WATER FLOW SWITCH
PIV		POST INDICATOR VALVE
VTS		VALVE TAMPER SWITCH

TYPICAL ZONE NOMENCLATURE: 75 N2-4 — "N2" DENOTES NOTIFICATION CIRCUIT "4" DENOTES DEVICE NUMBER; "75" DENOTES CANDELA RATING OF STROBE; H D1-5 — "D1" DENOTES DETECTION ZONE "5" DENOTES DEVICE NUMBER

GENERAL ELECTRICAL SYMBOLS

RECESSED	SURFACE	
		DISCONNECT SWITCH, 30 AMP MINIMUM UNLESS NOTED OTHERWISE
		FUSED DISCONNECT SWITCH, 30 AMP MINIMUM UNLESS NOTED OTHERWISE
		COMBINATION DISCONNECT SWITCH MOTOR STARTED
	S	MOTOR, 5 HP INDICATED
	T	TRANSFORMER
		RELAY OR EQUIPMENT CABINET AS INDICATED ON PLAN
		LIGHTING OR POWER PANEL BOARD

	FREE STANDING SWITCHBOARD, MOTOR CONTROL CENTER OR DISTRIBUTION BOARD
	FIRE TREATED PLYWOOD BACKBOARD 3/4"X96" HIGH X LENGTH AS INDICATED
EEE	ELECTRICAL EQUIPMENT DESIGNATION DESIGNED "EQ01"
1	REFERENCE TO NOTE "1" ON SAME SHEET
FA	LIGHTING FIXTURE DESIGNATION FA = FIXTURE TYPE
P 1	MECHANICAL EQUIPMENT DESIGNATION "P-1" INDICATED
X33	EQUIPMENT NAME OR NUMBER
+4'-6"	MOUNTING HEIGHT FROM FINISHED FLOOR TO CENTERLINE OF OUTLET OR EQUIPMENT
MH=4'-6"	MOUNTING HEIGHT FROM FINISHED FLOOR TO BOTTOM OF OUTLET OR EQUIPMENT
1 E-6	DETAIL REFERENCE NUMBER "1" ON DRAWING "E-6"
A E-6	SECTION OR ELEVATION REFERENCE LETTER "A" ON DRAWING "E-6"
A-1,3,5	INDICATES HOMERUN WITH THREE CIRCUITS AND A SEPARATE NEUTRALS

RACEWAYS AND WIRING

FLOOR	WALL	CEILING	
			CONDUIT CONCEALED IN CEILING OR WALL SPACE
			CONDUIT RUN EXPOSED
			CONDUIT RUN UNDERGROUND OR CONCEALED IN FLOOR SPACE
			EXISTING CONDUIT TO REMAIN
			CONDUIT RISING UP FROM RUN
			CONDUIT DROPPING DOWN FROM RUN
A-1	A-1	A-1	HOMERUN TO PANELBOARD, CABINET OR TERMINAL BACKBOARD AS INDICATED
(MS-01)	(MS-01)	(MS-01)	HOMERUN TO SWITCHBOARD OR MCC AS INDICATED. REFER TO SINGLE LINE DIAGRAM FOR CONDUIT AND WIRE SIZES
<RA-1>	<RA-1>	<RA-1>	HOMERUN TO PANEL VIA INDICATED LIGHTING CONTROL RELAY CABINET. REFER TO INDICATED RELAY CABINET SCHEDULE FOR ADDITIONAL INFORMATION AND CONTROL REQUIREMENTS

NOTE: NOT ALL SYMBOLS AND NOTES SHOWN ARE APPLICABLE FOR THIS PROJECT.

AGENCY APPROVAL:

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL LEGEND

ADDENDUM #2

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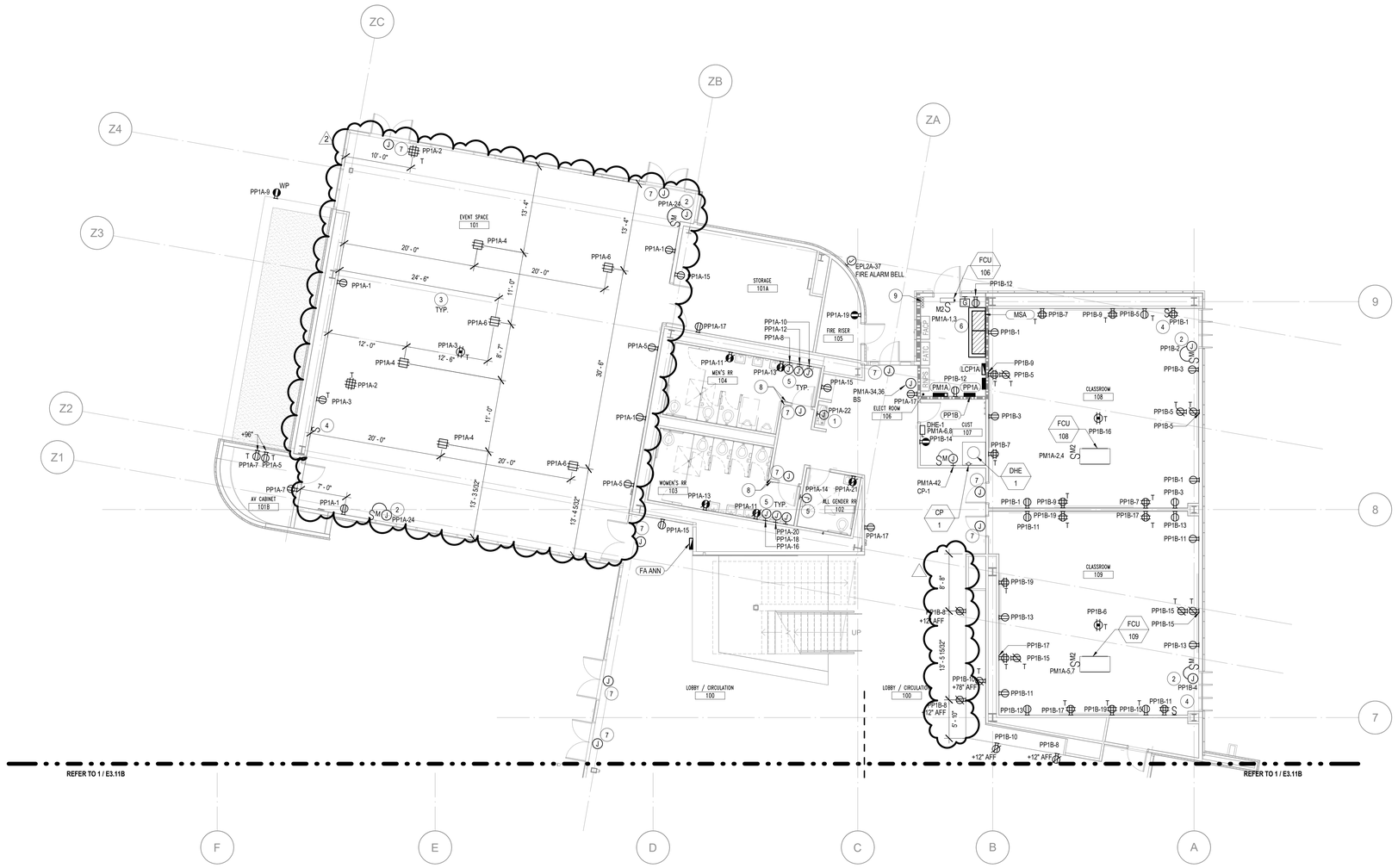

GENERAL NOTES

A. COORDINATE EXACT LOCATIONS OF ALL ARCHITECTURAL, MECHANICAL AND PLUMBING EQUIPMENT WITH ARCHITECTURAL, MECHANICAL AND PLUMBING DRAWINGS.

B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

C. SIZE FUSES FOR ALL MECHANICAL AND PLUMBING EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.

D. IN FINISH INTERIOR AREAS, RUN ALL CONDUITS CONCEALED, UNLESS OTHERWISE NOTED. PAINT ALL EXPOSED CONDUITS AND ELECTRICAL EQUIPMENT. REFER TO ARCHITECTS PAINTING SECTION FOR REQUIREMENTS.

E. ALL CABLING ASSOCIATED WITH TELECOM, AV AND SECURITY SHALL BE IN CONDUIT.

F. MULTIWIRE BRANCH CIRCUITS SHALL NOT BE SERVED FROM MULTIPLE SINGLE POLE BREAKERS. PROVIDE DEDICATED NEUTRAL PER CIRCUIT TO DISCONNECT MULTIWIRE BRANCH CIRCUITS PER CEC 210.4(B).

G. REFER ARCHITECTURAL DRAWINGS FOR ALL DEVICE MOUNTING HEIGHTS.

H. ALL ELECTRICAL ROOM DOORS ARE EGRESS DOORS AND SHOULD SWING OUT PER NEC. PANIC HARDWARE IS REQUIRED.

I. CONTRACTOR TO REFERENCE SECURITY DRAWINGS FOR ADDITIONAL CONDUITS REQUIRED FOR ACCESS CONTROL SYSTEMS.

REFERENCE NOTES

1. PROVIDE POWER CONNECTION FOR BOTTLE FILLER/DRINKING FOUNTAIN. REFERENCE EQUIPMENT CUTSHEETS AND PLUMBING DRAWINGS FOR FURTHER INFORMATION.COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
2. CONNECTION TO MOTORIZED SHADE. COORDINATE EXACT POWER AND CONTROL REQUIREMENTS WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
3. 2-GANG INFLOOR BOX SIMILAR TO HUBBELL INFLOOR BOX. COVERPLATE COLOR FINISH BY ARCHITECT.
4. CONTROL SWITCH FOR MOTORIZED SHADE. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
5. POWER CONNECTION FOR HAND DRYERS. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
6. PROVIDE 2" MINIMUM HOUSEKEEPING PAD FOR EQUIPMENT.
7. PROVIDE POWER CONNECTION FOR DOOR HARDWARE FROM SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE SECURITY DRAWINGS SE-W1 FOR CONNECTION AND WIRING INFORMATION.
8. PROVIDE 3/4" CONDUIT FROM WALL MOUNTED AUTO ACTUATORS TO POWER SUPPLY ON TOP OF THE DOOR.
9. PROVIDE (4) 2" CONDUITS STUB-UP FOR FUTURE PV SYSTEM TO MAIN ELECTRICAL ROOM ON LEVEL 2. VERIFY LOCATION WITH ARCHITECT PRIOR TO ROUGH IN. LABEL BOTH ENDS OF THE CONDUIT WITH THE LOCATION OF THE OPPOSITE END AND FUTURE PV.

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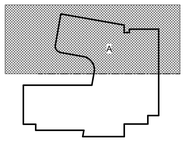

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL POWER PLAN - FIRST FLOOR - SEGMENT A

ADDENDUM #2

FILE NO.: **36-C1** | A# : **04-119722**

DATE: **01.19.2022** | CLIENT PROJ NO:

SHEET:

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ELECTRICAL POWER PLAN - FIRST FLOOR - SEGMENT A **1** 1/8" = 1'-0"

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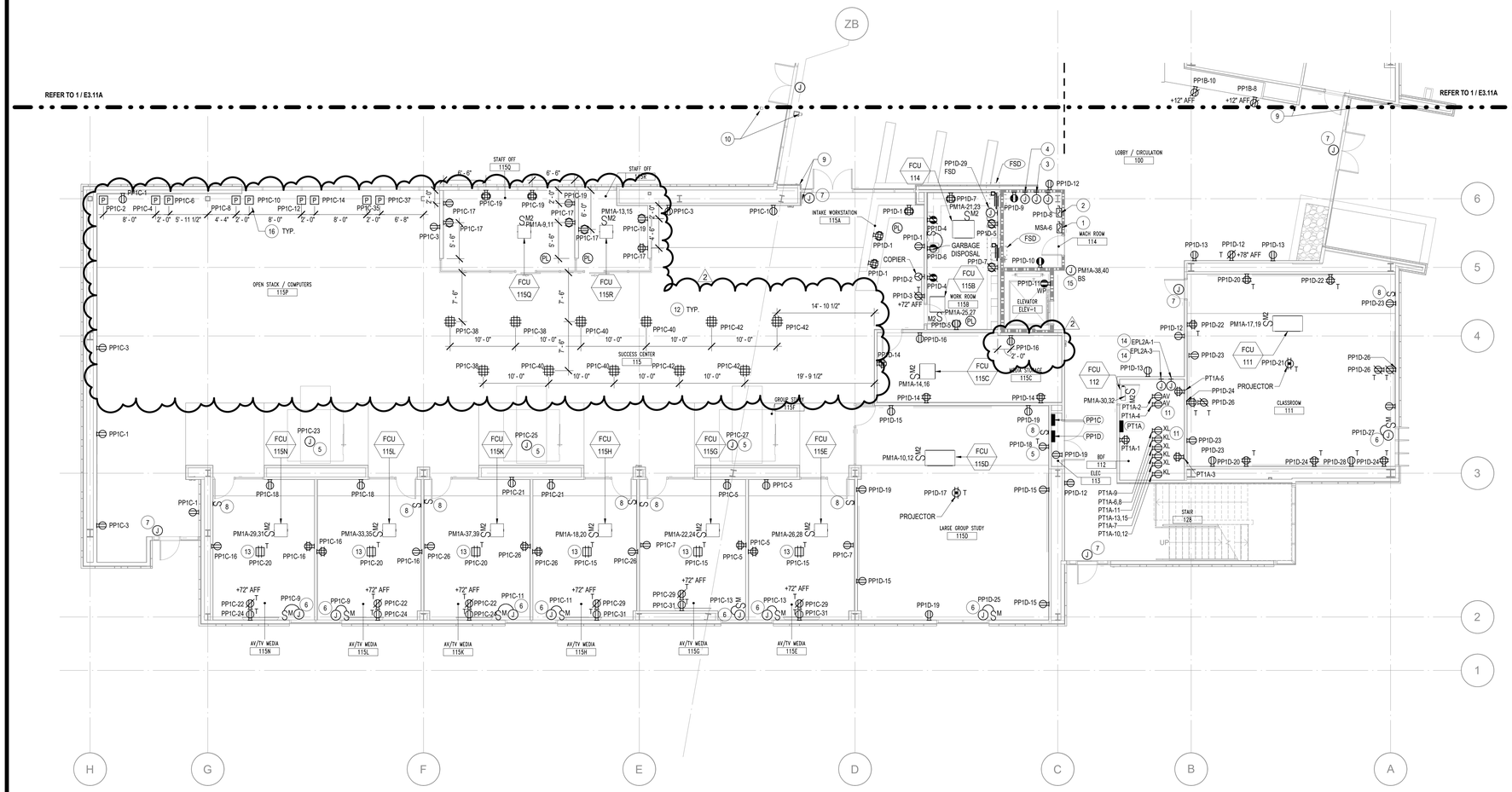

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D. IN FINISH INTERIOR AREAS, RUN ALL CONDUITS CONCEALED, UNLESS OTHERWISE NOTED. PAINT ALL EXPOSED CONDUITS AND ELECTRICAL EQUIPMENT. REFER TO ARCHITECTS PAINTING SECTION FOR REQUIREMENTS.

E. ALL CABLING ASSOCIATED WITH TELECOM, AV AND SECURITY SHALL BE IN CONDUIT.

F. MULTIWIRE BRANCH CIRCUITS SHALL NOT BE SERVED FROM MULTIPLE SINGLE POLE BREAKERS. PROVIDE DEDICATED NEUTRAL PER CIRCUIT TO DISCONNECT MULTIWIRE BRANCH CIRCUITS PER CEC 210.4(B).

G. REFER ARCHITECTURAL DRAWINGS FOR ALL DEVICE MOUNTING HEIGHTS.

H. ALL ELECTRICAL ROOM DOORS ARE EGRESS DOORS AND SHOULD SWING OUT PER NEC. PANIC HARDWARE IS REQUIRED.

I. CONTRACTOR TO REFERENCE SECURITY DRAWINGS FOR ADDITIONAL CONDUITS REQUIRED FOR ACCESS CONTROL SYSTEMS.

REFERENCE NOTES

1. ELEVATOR MAIN POWER DISCONNECT. COORDINATE EXACT LOCATION WITH ELEVATOR INSTALLER PRIOR TO ROUGH IN. SEE SINGLE LINE DIAGRAM FOR ADDITIONAL REQUIREMENTS.
2. ELEVATOR CAB LIGHT DISCONNECT SWITCH AND J-BOX. COORDINATE EXACT LOCATION WITH ELEVATOR INSTALLER.
3. PROVIDE J-BOX FOR FIRE ALARM CONNECTION TO ELEVATOR CONTROLLER. COORDINATE EXACT LOCATION WITH ELEVATOR INSTALLER.
4. PROVIDE J-BOX FOR COMMUNICATION TO ELEVATOR CONTROLLER. COORDINATE EXACT LOCATION WITH ELEVATOR INSTALLER AND TECHNOLOGY CONTRACTOR.
5. PROVIDE CONNECTION TO FURNITURE SYSTEMS. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE EQUIPMENT INSTALLATION MANUAL FOR WIRING INFORMATION.
6. CONNECTION TO MOTORIZED SHADE. COORDINATE EXACT LOCATION FOR POWER AND CONTROLS WITH ARCHITECT. REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
7. PROVIDE POWER CONNECTION FOR DOOR HARDWARE FROM SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE SECURITY DRAWINGS SE-W1 FOR CONNECTION AND WIRING INFORMATION.
8. CONTROL SWITCH FOR MOTORIZED SHADE. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
9. PROVIDE 3/4" CONDUIT FROM WALL MOUNTED AUTO ACTUATORS TO POWER SUPPLY ON TOP OF THE DOOR.
10. PROVIDE 3/4" CONDUIT FROM BOLLARD MOUNTED AUTO ACTUATORS TO POWER SUPPLY ON TOP OF THE DOOR.
11. RECEPTACLE ON TELECOM LADDER CABLE RUNWAY.

    XL - ELECTRICAL DUPLEX 120V/20A (NEMA L5-20R) DEDICATED OUTLET.
    RL - ELECTRICAL 208V/30A (NEMA L6-30R) DEDICATED OUTLET.
    AV - ELECTRICAL DUPLEX 120V/20A OUTLET FOR AV SYSTEM.
12. 2-GANG INFLOOR BOX SIMILAR TO HUBBELL INFLOOR BOX. COVERPLATE COLOR FINISH BY ARCHITECT.
13. SINGLE GANG INFLOOR BOX SIMILAR TO HUBBELL INFLOOR BOX. COVERPLATE FINISH BY ARCHITECT.
14. 120V POWER CONNECTION FOR SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT.
15. PROVIDE JUNCTION BOX FOR POWER CONNECTIONS TO HVAC CONTROLS AND SMALL EQUIPMENT FROM JUDNTION BOX LOCATED ABOVE CEILING. EXTEND WIRES AND CONDUIT (3/4"C. (2)#12, & (1)#12 GND), TO EACH HVAC CONTROL AND SMALL EQUIPMENT LOCATION. REFER TO MECHANICAL AND PLUMBING DOCUMENTS FOR LOCATIONS OF BSB'S, VAV'S, DDC PANELS, ETC. PAINT BOX YELLOW AND PROVIDE ENGRAVED PLACARD TO READ "MECHANICAL SYSTEMS CONTROL POWER ONLY. CONNECT MAX 200 WATTS PER CIRCUIT."
16. PROVIDE FURNITURE FEED FLOOR BOX SIMILAR TO WIREMOLD EVOLUTION SERIES EFBFF. COLOR BY ARCHITECT.

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	02.11.2022

KEYNOTES

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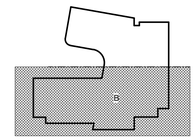
REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER P. MARRAN No. E-14506 REN. JUNE 30, 2022 ELECTRICAL STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL POWER PLAN - FIRST FLOOR - SEGMENT B

ADDENDUM #2

FILE NO.: **36-C1** A# : **04-119722**

DATE: **01.19.2022** CLIENT PROJ NO:

SHEET:

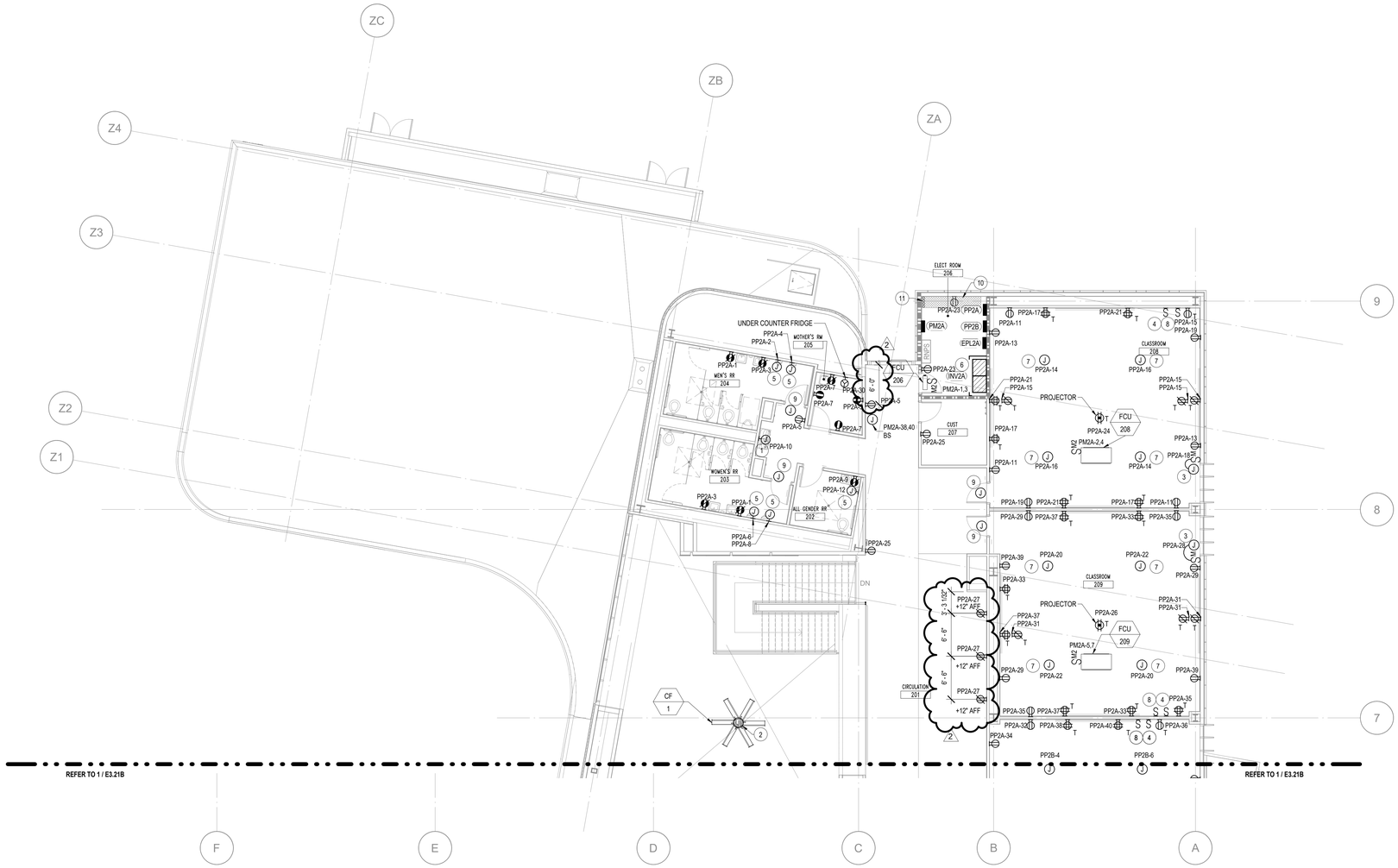
E3.11B

ELECTRICAL POWER PLAN - FIRST FLOOR - SEGMENT B 1 1/8" = 1'-0"

PLEASE RECYCLE

BIM 360://5009 Chino Chaffey CC - Campus Projects/5009006000-MEP-CCCIB.rvt
2/4/2022 8:31:24 AM

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON FULL SIZE (ARCH D) SHEETS ORIGINAL SIZE 30"X42"



GENERAL NOTES

A. COORDINATE EXACT LOCATIONS OF ALL ARCHITECTURAL, MECHANICAL AND PLUMBING EQUIPMENT WITH ARCHITECTURAL, MECHANICAL AND PLUMBING DRAWINGS.

B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

C. SIZE FUSES FOR ALL MECHANICAL AND PLUMBING EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.

D. IN FINISH INTERIOR AREAS, RUN ALL CONDUITS CONCEALED, UNLESS OTHERWISE NOTED. PAINT ALL EXPOSED CONDUITS AND ELECTRICAL EQUIPMENT. REFER TO ARCHITECTS PAINTING SECTION FOR REQUIREMENTS.

E. ALL CABLING ASSOCIATED WITH TELECOM, AV AND SECURITY SHALL BE IN CONDUIT.

F. MULTIWIRE BRANCH CIRCUITS SHALL NOT BE SERVED FROM MULTIPLE SINGLE POLE BREAKERS. PROVIDE DEDICATED NEUTRAL PER CIRCUIT TO DISCONNECT MULTIWIRE BRANCH CIRCUITS PER CEC 210.4(B).

G. REFER ARCHITECTURAL DRAWINGS FOR ALL DEVICE MOUNTING HEIGHTS.

H. ALL ELECTRICAL ROOM DOORS ARE EGRESS DOORS AND SHOULD SWING OUT PER NEC. PANIC HARDWARE IS REQUIRED.

I. CONTRACTOR TO REFERENCE SECURITY DRAWINGS FOR ADDITIONAL CONDUITS REQUIRED FOR ACCESS CONTROL SYSTEMS.

REFERENCE NOTES

1. PROVIDE POWER CONNECTION FOR BOTTLE FILLER/DRINKING FOUNTAIN. REFERENCE EQUIPMENT CUTSHEETS' AND PLUMBING DRAWINGS FOR FURTHER INFORMATION.COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
2. PROVIDE POWER CONNECTION TO CEILING FAN. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE EQUIPMENT CUTSHEET FOR WIRING AND CONTROL REQUIREMENTS.
3. CONNECTION TO MOTORIZED SHADES. COORDINATE EXACT LOCATION FOR POWER AND CONTROLS WITH ARCHITECT. REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
4. CONTROL SWITCH FOR MOTORIZED SHADE. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
5. CONNECTION FOR HAND DRYERS. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
6. PROVIDE MINIMUM 2" HOUSEKEEPING PAD FOR EQUIPMENT.
7. CONNECTION TO SKYLIGHT DIMMER. COORDINATE EXACT POWER AND CONTROL REQUIREMENTS WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
8. CONTROL SWITCH FOR SKYLIGHT DIMMER. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
9. PROVIDE POWER CONNECTION FOR DOOR HARDWARE FROM SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE SECURITY DRAWINGS SE-W1 FOR CONNECTION AND WIRING INFORMATION.
10. RESERVED SPACE FOR FUTURE PV EQUIPMENT.
11. PROVIDE (4) 2" CONDUITS STUB-UP FOR FUTURE PV SYSTEM FROM MAIN ELECTRICAL ROOM ON LEVEL 1. VERIFY LOCATION WITH ARCHITECT PRIOR TO ROUGH IN. LABEL BOTH ENDS OF THE CONDUIT WITH THE LOCATION OF THE OPPOSITE END AND FUTURE PV.

TN
PN

ELECTRICAL POWER PLAN - SECOND FLOOR - SEGMENT A | **1** 1/8" = 1'-0"

PLEASE RECYCLE

AGENCY APPROVAL:

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2	ADDENDUM 2	02.11.2022

KEYNOTES

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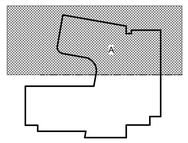
DAVID P. MARQUEZ
No. E-14506
REN. JUNE 30, 2022
ELECTRICAL
STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL POWER PLAN - SECOND FLOOR - SEGMENT A

ADDENDUM #2

FILE NO.: 36-C1	A# : 04-119722
DATE: 01.19.2022	CLIENT PROJ NO:

SHEET:

E3.21A

BIM 360://5009 Chino Chaffey CC - Campus Projects/5009006000-MEP-CCCIB.rvt
2/4/2022 9:31:39 AM

THE LINE SHOWN ABOVE IS EXACTLY 1" WHEN PRINTED AT 36" SHEETS (ORIGINAL SHEET SIZE)

GENERAL NOTES

A. COORDINATE EXACT LOCATIONS OF ALL ARCHITECTURAL, MECHANICAL AND PLUMBING EQUIPMENT WITH ARCHITECTURAL, MECHANICAL AND PLUMBING DRAWINGS.

B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

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G. REFER ARCHITECTURAL DRAWINGS FOR ALL DEVICE MOUNTING HEIGHTS.

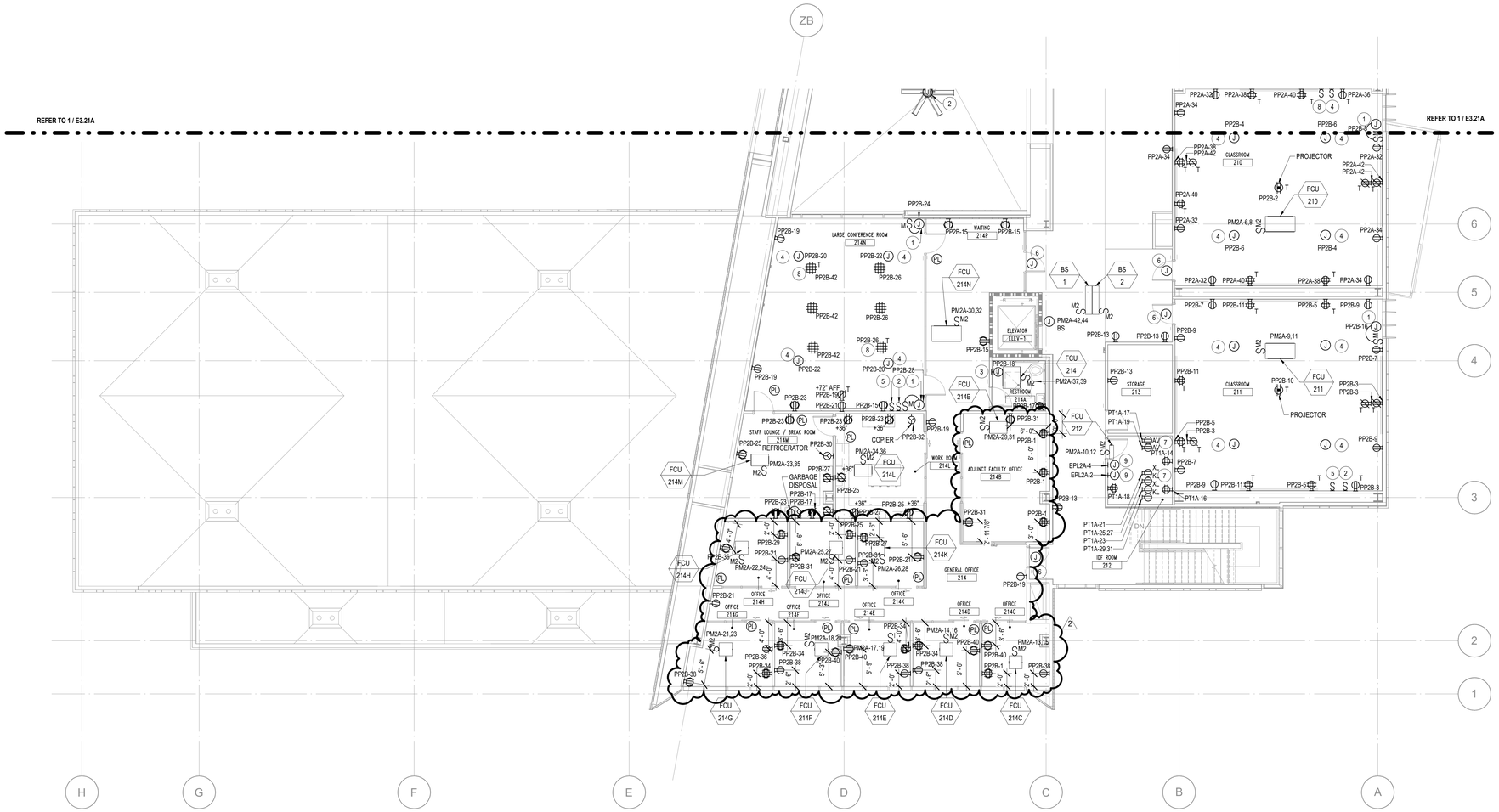
H. ALL ELECTRICAL ROOM DOORS ARE EGRESS DOORS AND SHOULD SWING OUT PER NEC. PANIC HARDWARE IS REQUIRED.

I. CONTRACTOR TO REFERENCE SECURITY DRAWINGS FOR ADDITIONAL CONDUITS REQUIRED FOR ACCESS CONTROL SYSTEMS.

REFERENCE NOTES

1. CONNECTION TO MOTORIZED SCREEN. COORDINATE EXACT LOCATION FOR POWER AND CONTROLS WITH ARCHITECT REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
2. CONTROL SWITCH FOR MOTORIZED SHADE. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
3. CONNECTION TO HAND DRYER. COORDINATE EXACT LOCATION WITH THE ARCHITECT PRIOR TO ROUGH-IN.
4. CONNECTION TO SKYLIGHT DIMMER. COORDINATE EXACT POWER AND CONTROL REQUIREMENTS WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
5. CONTROL SWITCH FOR SKYLIGHT DIMMER. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
6. PROVIDE POWER CONNECTION FOR DOOR HARDWARE FROM SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE SECURITY DRAWINGS SE-W1 FOR CONNECTION AND WIRING INFORMATION.
7. RECEPTACLE ON TELECOM LADDER CABLE RUNWAY.

   XL - ELECTRICAL DUPLEX 120V/20A (NEMA L5-20R) DEDICATED OUTLET.
   RL - ELECTRICAL 208V/30A (NEMA L6-30R) DEDICATED OUTLET.
   AV - ELECTRICAL DUPLEX 120V/20A OUTLET FOR AV SYSTEM.
8. 2-GANG INFLOOR BOX SIMILAR TO HUBBELL INFLOOR BOX. COVERPLATE COLOR FINISH BY ARCHITECT.
9. 120V POWER CONNECTION FOR SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT.



ELECTRICAL POWER PLAN - SECOND FLOOR - SEGMENT B | 1 | 1/8" = 1'-0"

PLEASE RECYCLE

AGENCY APPROVAL:

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HMC Architects

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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	02.11.2022

KEYNOTES

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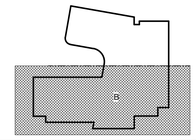
REGISTERED PROFESSIONAL ENGINEER
CLIFTON P. MARRATT
No. E-14506
REN. JUNE 30, 2022
ELECTRICAL
STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL POWER PLAN - SECOND FLOOR - SEGMENT B

ADDENDUM #2

FILE NO.: 36-C1 | **A# : 04-119722**

DATE: **01.19.2022** | CLIENT PROJ NO:

SHEET:

E3.21B

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2/4/2022 8:31:38 AM

THE LINE SHOWN ABOVE IS 1" LONG ON ORIGINAL PLOT. IF NOT, ADJUST SCALE ACCORDINGLY

PANEL: PP1A

VOLTS: 120/208 **PHASES:** 3 **WIRES:** 4 **MOUNTING:** SURFACE
LOCATION: ELECT ROOM 106 **SUPPLY FROM:** MSA **KAIC:** 25KA **KASC:** 17.5KA
MAIN BREAKER: 200 A **AMP BUSSING:** 225 A **NEUTRAL BUS:** 225 A **IG BUS:** NA

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	R - EVENT SPACE 101	20 A	1	720	720					1	20 A	R - EVENT SPACE 101	2
3	R - PROJECTOR EVENT SPACE 101	20 A	1			1180	540			1	20 A	R - EVENT SPACE 101	4
5	R - EVENT SPACE 101	20 A	1					540	540	1	20 A	R - EVENT SPACE 101	6
7	R - AV CABINET 101B	20 A	1	360	1725					1	20 A	R - HAND DRYER MEN'S RR 104	8
9	R - OUTDOOR	20 A	1			180	1725			1	20 A	R - HAND DRYER MEN'S RR 104	10
11	R - RESTROOM 103 & 104	20 A	1					360	1725	1	20 A	R - HAND DRYER MEN'S RR 104	12
13	R - RESTROOM 103 & 104	20 A	1	360	500					1	20 A	R - HAND DRYER ALL GENDER RR 102	14
15	R - LOBBY 100 & STORAGE 101A	20 A	1			540	1725			1	20 A	R - HAND DRYER WOMEN'S RR 103	16
17	R - LOBBY 100 & STORAGE 101A	20 A	1					540	1725	1	20 A	R - HAND DRYER MEN'S RR 104	18
19	R - FIRE RISER 102	20 A	1	180	1725					1	20 A	R - HAND DRYER MEN'S RR 104	20
21	R - ALL GENDER RR 102	20 A	1			180	500			1	20 A	R - WATER FOUNTAIN LOBBY 100	22
23	L - LIGHTING 101 & 101B	20 A	1					425	500	1	20 A	R - MOTORIZED SHADES EVENT SPACE 101	24
25	L - LIGHTING STORAGE...	20 A	1	1210	185					1	20 A	L - LIGHTING EVENT SPACE 101	26
27	L - LIGHTING EXTERIOR	20 A	1			109	485			1	20 A	L - LIGHTING EVENT SPACE 101	28
29	L - LIGHTING EXTERIOR	20 A	1					684	437	1	20 A	L - LIGHTING EXTERIOR	30
31	L - LIGHTING EXTERIOR	20 A	1	342	646					1	20 A	L - LIGHTING EXTERIOR	32
33	L - LIGHTING EXTERIOR	20 A	1			1526	555			1	20 A	L - LIGHTING EXTERIOR	34
35	R - RECEPTACLE EXTERIOR	20 A	1					720	360	1	20 A	R - RECEPTACLE EXTERIOR	36
37	R - RECEPTACLE EXTERIOR	20 A	1	180	500					1	20 A	R - RECEPTACLE	38
39	SPARE	20 A	1			0	0			1	20 A	SPARE	40
41	SPARE	20 A	1					0	0	1	20 A	SPARE	42
43	SPARE	20 A	1	0	0					1	20 A	SPARE	44
45	SPARE	20 A	1			0	0			1	20 A	SPARE	46
47	SPARE	20 A	1					0	0	1	20 A	SPARE	48
				9352 VA		9245 VA		8556 VA					
				Ø A		Ø B		Ø C					

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
R - RECEPTACLE	20550 VA	74.33%	15275 VA
L - LIGHTING	6603 VA	125.00%	8254 VA

PANEL TOTALS	
TOTAL CONNECTED LOAD:	27153 VA
TOTAL CONNECTED CURRENT:	75 A
TOTAL ESTIMATED DEMAND LOAD:	23529 VA
TOTAL ESTIMATED DEMAND CURRENT:	65 A

PANEL: PP1B

VOLTS: 120/208 **PHASES:** 3 **WIRES:** 4 **MOUNTING:** SURFACE
LOCATION: ELECT ROO... **SUPPLY FROM:** MSA **KAIC:** 25KA **KASC:** 16.7KA
MAIN BREAKER: 200 A **AMP BUSSING:** 225 A **NEUTRAL BUS:** 225 A **IG BUS:** NA

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	R - CLASSROOM 108	20 A	1	720	500					1	20 A	R - MOTORIZED SHADES CLASSROOM 108	2
3	R - CLASSROOM 108	20 A	1			540	500			1	20 A	R - MOTORIZED SHADES CLASSROOM 109	4
5	R - CLASSROOM 108	20 A	1					720	1000	1	20 A	R - PROJECTOR CLASSROOM 109	6
7	R - CLASSROOM 108	20 A	1	420	540					1	20 A	R - LOBBY 100	8
9	R - CLASSROOM 108	20 A	1			360	360			1	20 A	R - LOBBY 100	10
11	R - CLASSROOM 109	20 A	1					720	360	1	20 A	R - ELECT ROOM 106	12
13	R - CLASSROOM 109	20 A	1	720	180					1	20 A	R - CUST 107	14
15	R - CLASSROOM 109	20 A	1			720	1000			1	20 A	R - PROJECTOR CLASSROOM 108	16
17	R - CLASSROOM 109	20 A	1					360	978	1	20 A	L - LIGHTING ELECT ROOM 106	18
19	R - CLASSROOM 109	20 A	1	360	500					1	20 A	FACP ELECT ROOM 106	20
21	SPARE	20 A	1			0	500			1	20 A	RNPS ELECT ROOM 106	22
23	SPARE	20 A	1					0	0	1	20 A	SPARE	24
25	SPARE	20 A	1	0	0					1	20 A	SPARE	26
27	SPARE	20 A	1			0	0			1	20 A	SPARE	28
29	SPARE	20 A	1					0	0	1	20 A	SPARE	30
31	SPACE	--	--	0	0					--	--	SPACE	32
33	SPACE	--	--			0	0			--	--	SPACE	34
35	SPACE	--	--					0	0	--	--	SPACE	36
37	SPACE	--	--	0	0					--	--	SPACE	38
39	SPACE	--	--			0	0			--	--	SPACE	40
41	SPACE	--	--					0	0	--	--	SPACE	42
				3940 VA		3980 VA		4138 VA					
				Ø A		Ø B		Ø C					

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
Other	1000 VA	100.00%	1000 VA
R - RECEPTACLE	10080 VA	99.60%	10040 VA
L - LIGHTING	978 VA	125.00%	1223 VA

PANEL TOTALS	
TOTAL CONNECTED LOAD:	12058 VA
TOTAL CONNECTED CURRENT:	33 A
TOTAL ESTIMATED DEMAND LOAD:	12263 VA
TOTAL ESTIMATED DEMAND CURRENT:	34 A

PANEL: PP1C

VOLTS: 120/208 **PHASES:** 3 **WIRES:** 4 **MOUNTING:** SURFACE
LOCATION: **SUPPLY FROM:** MSA **KAIC:** 10KA **KASC:** 6.9KA
MAIN BREAKER: 200 A **AMP BUSSING:** 225 A **NEUTRAL BUS:** 225 A **IG BUS:** NA

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	R - OPEN STACK/COMPUTERS 115P	20 A	1	720	1200					1	20 A	R - OPEN STACK / COMPUTERS 115P	2
3	R - OPEN STACK/COMPUTERS 115P	20 A	1			720	1200			1	20 A	R - OPEN STACK / COMPUTERS 115P	4
5	R - AV/TV MEDIA 115K, 115H	20 A	1					600	1200	1	20 A	R - OPEN STACK / COMPUTERS 115P	6
7	R - AV/TV MEDIA 115K, 115H	20 A	1	360	1200					1	20 A	R - OPEN STACK / COMPUTERS 115P	8
9	R - AV/TV MEDIA 115N, 115L	20 A	1			1000	1200			1	20 A	R - OPEN STACK / COMPUTERS 115P	10
11	R - AV/TV MEDIA 115K, 115H	20 A	1					1000	1200	1	20 A	R - OPEN STACK / COMPUTERS 115P	12
13	R - AV/TV MEDIA 115Q, 115E	20 A	1	1000	1200					1	20 A	R - OPEN STACK / COMPUTERS 115P	14
15	R - FB AV/TV MEDIA 115H, 115G, 115E	20 A	1			540	600			1	20 A	R - AV/TV MEDIA 115N, 115L	16
17	R - STAFF OFF 115Q, 115R	20 A	1					720	360	1	20 A	R - AV/TV MEDIA 115N, 115L	18
19	R - STAFF OFF 115Q, 115R	20 A	1	660	540					1	20 A	R - FB AV/TV MEDIA 115K, 115L, 115N	20
21	R - AV/TV MEDIA 115K, 115H	20 A	1			360	540			1	20 A	R - AV/TV MEDIA 115K, 115L, 115N	22
23	R - FURNITURE SYSTEMS GROUP STUDY...	20 A	1					500	540	1	20 A	R - AV/TV MEDIA 115K, 115L, 115N	24
25	R - FURNITURE SYSTEMS GROUP STUDY 115J	20 A	1	500	600					1	20 A	R - AV/TV MEDIA 115K, 115H	26
27	R - FURNITURE SYSTEMS STUDY 115F	20 A	1			500	1016			1	20 A	L - LIGHTING 115 (N,L,K,H,G,E,F)	28
29	R - AV/TV MEDIA ROOM 115E, 115G, 115H	20 A	1					540	66	1	20 A	L - LIGHTING 115	30
31	R - AV/TV MEDIA ROOM 115E, 115G, 115H	20 A	1	540	0					1	20 A	SPARE	32
33	L - LIGHTING 115, 115Q, 115R	20 A	1			1143	0			1	20 A	SPARE	34
35	R - OPEN STACK / COMPUTERS 115P	20 A	1					1200	0	1	20 A	SPARE	36
37	R - OPEN STACK / COMPUTERS 115P	20 A	1	1200	1080					1	20 A	R - FB SUCCESS CENTER 115	38
39	SPARE	20 A	1			0	1440			1	20 A	R - FB SUCCESS CENTER 115	40
41	SPARE	20 A	1					0	1440	1	20 A	R - FB SUCCESS CENTER 115	42
				10800 VA		10259 VA		9366 VA					
				Ø A		Ø B		Ø C					

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
R - RECEPTACLE	28200 VA	67.73%	19100 VA
L - LIGHTING	2225 VA	125.00%	2782 VA

PANEL TOTALS	
TOTAL CONNECTED LOAD:	30425 VA
TOTAL CONNECTED CURRENT:	84 A
TOTAL ESTIMATED DEMAND LOAD:	21882 VA
TOTAL ESTIMATED DEMAND CURRENT:	61 A

PANEL: PP1D

VOLTS: 120/208 **PHASES:** 3 **WIRES:** 4 **MOUNTING:** SURFACE
LOCATION: **SUPPLY FROM:** MSA **KAIC:** 10KA **KASC:** 6.9KA
MAIN BREAKER: 200 A **AMP BUSSING:** 225 A **NEUTRAL BUS:** 225 A **IG BUS:** NA

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	R - INTAKE WORKSTATION 115A	20 A	1	720	1200					1	20 A	R - COPIER 115A	2
3	R - INTAKE WORKSTATION 115A	20 A	1			180	360			1	20 A	R - WORK ROOM 115B	4
5	R - WORK ROOM 115B	20 A	1					300	180	1	20 A	R - WORK ROOM 115B - GARBAGE DISPOSAL	6
7	R - WORK ROOM 115B	20 A	1	360	500					1	20 A	M - ELEVATOR CAB LIGHT	8
9	R - MACH ROOM 114	20 A	1			180	180			1	20 A	R - MACH ROOM 114	10
11	R - ELEVATOR 1	20 A	1					180	720	1	20 A	R - LOBBY / CIRCULATION 100	12
13	R - LOBBY / CIRCULATION 100	20 A	1	540	540					1	20 A	R - MEDIA STORAGE 115C	14
15	R - LARGE GROUP STUDY 115D	20 A	1			720	360			1	20 A	R - MEDIA STORAGE 115C	16
17	R - PROJECTOR LARGE GROUP STUDY 115D	20 A	1					1000	180	1	20 A	R - FURNITURE SYSTEMS L. GROUP STUDY...	18
19	R - LARGE GROUP STUDY 115D	20 A	1	720	360					1	20 A	R - CLASSROOM 111	20
21	R - PROJECTOR CLASSROOM 111	20 A	1			1000	360			1	20 A	R - CLASSROOM 111	22
23	R - CLASSROOM 111	20 A	1					720	540	1	20 A	R - CLASSROOM 111	24
25	R - MOTORIZED SHADES GROUP STUDY 115D	20 A	1	500	540					1	20 A	R - CLASSROOM 111	26
27	R - MOTORIZED SHADES CLASSROOM 111	20 A	1			500	180			1	20 A	R - CLASSROOM 111	28
29	R - FIRE/SMOKE DAMPERS LOBBY 100	20 A	1					1200	904	1	20 A	L - LIGHTING 114, 115B, 115C, 115D & ELEV	30
31	SPARE	20 A	1	0	878					1	20 A	L - LIGHTING	32
33	SPARE	20 A	1			0	0			1	20 A	SPARE	34
35	SPARE	20 A	1					0	0	1	20 A	SPARE	36
37	SPARE	20 A	1	0	0					1	20 A	SPARE	38
39	SPARE	20 A	1			0	0			1	20 A	SPARE	40
41	SPARE	20 A	1					0	0	1	20 A	SPARE	42
				6858 VA		4020 VA		5924 VA					
				Ø A		Ø B		Ø C					

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
Other	1200 VA	100.00%	1200 VA
R - RECEPTACLE	13320 VA	87.54%	11660 VA
L - LIGHTING	2282 VA	125.00%	2853 VA

PANEL TOTALS	
TOTAL CONNECTED LOAD:	16802 VA
TOTAL CONNECTED CURRENT:	47 A
TOTAL ESTIMATED DEMAND LOAD:	15713 VA
TOTAL ESTIMATED DEMAND CURRENT:	44 A

PANEL: PT1A

VOLTS: 120/208 **PHASES:** 3 **WIRES:** 4 **MOUNTING:** SURFACE
LOCATION: BDF 112 **SUPPLY FROM:** MSA **KAIC:** 10KA **KASC:** 7.2KA
MAIN BREAKER: 200 A **AMP BUSSING:** 225 A **NEUTRAL BUS:** 225 A **IG BUS:**

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	CONVENIENCE OUTLET	20 A	1	180	180					1	20 A	OUTLET FOR AV SYSTEM	2
3	CONVENIENCE OUTLET	20 A	1			180	180			1	20 A	OUTLET FOR AV SYSTEM	4
5	CONVENIENCE OUTLET	20 A	1					180	90	2	30 A	R - RECEPTACLE BDF 112	6
7	208V DUPLEX ON TELECOM LADDER CABLE...	20 A	1	180	90					--	--	--	8
9	208V DUPLEX ON TELECOM LADDER CABLE...	20 A	1			180	90			2	30 A	R - RECEPTACLE BDF 112	10
11	208V DUPLEX ON TELECOM LADDER CABLE...	20 A	1					180	90	--	--	--	12
13	R - RECEPTACLE BDF 112	30 A	2	90	180					1	20 A	IDF - CONVENIENCE OUTLET ROOM 212	14
15	--	--	--			90	180			1	20 A	IDF - CONVENIENCE OUTLET ROOM 212	16
17	R - RECEPTACLE IDF ROOM 212	20 A	1					180	180	1	20 A	IDF - CONVENIENCE OUTLET ROOM 212	18
19	R - RECEPTACLE IDF ROOM 212	20 A	1	180	0					1	20 A	SPARE	20
21	208V DUPLEX ON TELECOM LADDER CABLE...	20 A	1			180	0			1	20 A	SPARE	22
23	208V DUPLEX ON TELECOM LADDER CABLE...	20 A	1					180	0	1	20 A	SPARE	24
25	R - RECEPTACLE IDF ROOM 212	30 A	2	90	0					1	20 A	SPARE	26
27	--	--	--			90	0			1	20 A	SPARE	28
29	R - RECEPTACLE IDF ROOM 212	30 A	2					90	0	1	20 A	SPARE	30
31	--	--	--	90	0					1	20 A	SPARE	32
33	SPARE	20 A	1			0	0			1	20 A	SPARE	34
35	SPARE	20 A	1					0	0	1	20 A	SPARE	36
37	SPACE	--	--	0	0					--	--	SPACE	38
39	SPACE	--	--			0	0			--	--	SPACE	40
41	SPACE	--	--					0	0	--	--	SPACE	42
				1260 VA		1170 VA		1170 VA					
				Ø A		Ø B		Ø C					

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
R - RECEPTACLE	3600 VA	100.00%	3600 VA

PANEL TOTALS	
TOTAL CONNECTED LOAD:	3600 VA
TOTAL CONNECTED CURRENT:	10 A
TOTAL ESTIMATED DEMAND LOAD:	3600 VA
TOTAL ESTIMATED DEMAND CURRENT:	10 A

LIGHTING CONTROL PANEL "LCP"

RELAY	LINE FEED	DIMMING	TYPE	VOLTAGE	SOURCE	DESCRIPTION	CONTROLLED BY
1	PP1A-29	YES	0-10V	120	NORMAL	P	TC,OR
2	PP1A-30	YES	0-10V	120	NORMAL	P, Q	TC,OR
3	PP1A-31	YES	0-10V	120	NORMAL	P	TC,OR
4	PP1A-32	YES	0-10V	120	NORMAL	P, Q	TC,OR
5	PP1A-33	YES	0-10V	120	NORMAL	R, V1, V2	TC,OR
6	PP1A-34	YES	0-10V	120	NORMAL	V1, V2	TC,OR
7							
8							
9							
10	EPL2A-33	YES	0-10V	120	EMERGENCY	P, Q	TC,OR
11	EPL2A-35	YES	0-10V	120	EMERGENCY	P, Q	TC,OR
12	EPL2A-36	YES	0-10V	120	EMERGENCY	P, Q	TC,OR
13							
14							
15							
16							
17							
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32							

TC= ASTRONOMICAL TIME CLOCK
OR= MANUAL OVERRIDE
OS= OCCUPANCY SENSOR

REFERENCE NOTES

1. PROVIDE JUNCTION BOX FOR 120V POWER CONNECTION TO SMOKE FIRE DAMPERS (SFD) (3/4"C, (2)#12, & (1)#12 GND). TO EACH SFD LOCATION. AT EACH SMOKE FIRE DAMPER PROVIDE A MANUAL MOTOR RATED SNAP SWITCH. REFER TO MECHANICAL PLANS FOR LOCATIONS AND NUMBER OF SFD'S. ROUTE CIRCUIT HOMERUN THROUGH CONTROL RELAY IN THE FACP. CONNECT MAX 1200 WATTS PER BRANCH CIRCUIT. PAINT JUNCTION BOX RED AND PROVIDE ENGRAVED PLACARD TO READ "FIRE DAMPERS ONLY".
2. PROVIDE RED HANDLE AND LOCK-ON DEVICE FOR ALL CIRCUITS FEEDING FIRE ALARM DEVICES, CABINETS OR EQUIPMENT. ALL CIRCUITS FEEDING FIRE ALARM DEVICES, CABINETS OR EQUIPMENT SHALL BE DEDICATED TO FIRE ALARM DEVICES ONLY. PROVIDE PLACARD TO READ "FIRE ALARM DEVICES".

PP1A	PP1B
PP1C	PP1D
PT1A	LCP

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

Chaffey College

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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	02.11.2022

KEYNOTES

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REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER P. MARCHESE
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REN. JUNE 30, 2022
ELECTRICAL
STATE OF CALIFORNIA

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL PANEL SCHEDULES

ADDENDUM #2

FILE NO.: **36-C1** A# : **04-119722**

DATE: **01.19.2022** CLIENT PROJ NO:

SHEET:

E7.01

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PLEASE RECYCLE

THE LINE SHOWN ABOVE IS 1" LONG ON ORIGINAL PLOT. IF NOT, ADJUST SCALE ACCORDINGLY

TELECOMMUNICATION SHEET SET

SEPARATION DISTANCE BETWEEN POWER CABLES AND DATA CABLES

CONDITION	MINIMUM SEPARATION DISTANCE		
	< 2 kVA	2-5 kVA	> 5kVA
UNSHIELDED POWER LINES OR ELECTRICAL EQUIPMENT IN PROXIMITY TO OPEN OR NONMETAL PATHWAYS.	5"	12"	24"
UNSHIELDED POWER LINES OR ELECTRICAL EQUIPMENT IN PROXIMITY TO A GROUNDED METAL CONDUIT PATHWAY.	2.5"	6"	12"
POWER LINES ENCLOSED IN A GROUNDED METAL CONDUIT (OR EQUIVALENT SHIELDING) IN PROXIMITY TO A GROUNDED METAL CONDUIT PATHWAY.		3"	6"
ELECTRICAL MOTORS AND TRANSFORMERS.			48"

SEPARATION DISTANCE BETWEEN DATA CABLES AND SPECIFIC EMI SOURCES

SOURCE OF DISTURBANCE	MINIMUM SEPARATION DISTANCE
FLUORESCENT LAMPS	5"
NEON LAMPS	5"
MERCURY VAPOUR LAMPS	5"
HIGH-INTENSITY DISCHARGE LAMPS	5"
ARC WELDERS	31"
FREQUENCY INDUCTION HEATING	39"

50' DISTANCE LIMIT RULE

A. IN NO CASE MUST A NON-LISTED OUTSIDE PLANT OR INCOMING SERVICE OUTDOOR RATED CABLE EXCEED 50 FEET FROM THE POINT OF ENTRANCE INTO ANY BUILDING. IF ON-SITE CONDITIONS RESULT IN A CASE WHERE THE CABLE EXCEEDS THE DISTANCE LIMIT THE CONTRACTOR MUST ADVISE A SOLUTION WITH THE PROJECT CONSULTANT. IN ALL CASES THE SOLUTION WOULD NEED TO INVOLVE EITHER TRANSITIONING FROM OUTDOOR NON-LISTED TO INDOOR LISTED CABLE VIA A SPLICE POINT (E.G. SPLICE CASE OR SPLICE ENCLOSURE FOR FIBER, PROTECTOR BLOCK FOR COPPER ETC.) OR THE ALTERNATIVE SHOULD BE TO ENCLOSE THE OUTDOOR RATED CABLE WITHIN INTERMEDIATE METAL CONDUIT (IMC) OR RIGID METAL CONDUIT (RMC) THAT IS PROPERLY SEALED AND BONDED TO A GROUNDING ELECTRODE. RETAINING THE OUTDOOR CABLE WITHIN CONDUIT SHOULD EFFECTIVELY EXTEND THE POINT OF ENTRANCE INTO THE BUILDING.

OSP DETECTION TAPE INCLUSION

A. IN ORDER TO REDUCE THE CHANCE OF ACCIDENTAL DIG-UP OF OUTSIDE PLANT DUCTBANK ELEMENTS IN THE FUTURE, PROVIDE A DETECTABLE WARNING TAPE CONTAINING METALLIC TRACINGS ALONG THE DUCTBANK PATH AT 12" BELOW GRADE MINIMUM. COLOR OF THE DETECTABLE TAPE SHALL BE ORANGE OR WHICHEVER COLOR THE COMMON GROUND ALLIANCE (CGA) HAS CURRENTLY DETERMINED FOR TELEVISION AND COMMUNITY ANTENNA TELEVISION (CATV) CABLES.

TELECOMMUNICATION SYMBOLS

SYMBOL	DESCRIPTION
E	ELEVATOR PHONE OUTLET - PROVIDE ONE ANALOG VOICE DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. ROUTE ONE 1.25" CONDUIT FROM ELEVATOR EQUIPMENT BOX TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. COORDINATE EXACT LOCATION WITH ELEVATOR VENDOR.
W	WALL PHONE OUTLET - PROVIDE ONE DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT AT 54" AFF UNLESS NOTED OTHERWISE.
	WALL STANDARD COMMUNICATION OUTLET - PROVIDE THREE DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT AT PROJECT'S STANDARD RECEPTACLE HEIGHT UNLESS NOTED OTHERWISE.
	FLOOR STANDARD COMMUNICATION OUTLET - PROVIDE THREE DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT IN FLOOR BOX. EXACT LOCATION TO BE COORDINATED BY ARCHITECT.
WAP	WIRELESS COMMUNICATION OUTLET (ACCESSIBLE CEILING) - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. COIL ADDITIONAL 15 FEET OF CABLE FOR RELOCATION OF OUTLET AFTER WIRELESS SITE SURVEY (BY OTHERS) IS COMPLETE. MOUNT ABOVE CEILING. PROVIDE ONE 1.25" CONDUIT FROM LOCATION TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY.
WAP1	WIRELESS COMMUNICATION OUTLET (HARD LID CEILING) - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY.
WAP	WALL WIRELESS COMMUNICATION OUTLET - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT AT 120" AFF UNLESS NOTED OTHERWISE.
XD	WALL DATA COMMUNICATION OUTLET - PROVIDE QUANTITY OF DROPS AS INDICATED BY SUBSCRIPT COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGL GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT AT 18" AFF UNLESS NOTED OTHERWISE.
XD	FLOOR DATA COMMUNICATION OUTLET - PROVIDE QUANTITY OF DROPS AS INDICATED BY SUBSCRIPT COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT IN FLOOR BOX. EXACT LOCATION TO BE COORDINATED BY ARCHITECT.
FP	DATA COMMUNICATION OUTLET AT FLAT PANEL DISPLAY LOCATION - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. MOUNTED IN FLAT PANEL IN-WALL BACKBOX. SEE EAV DRAWINGS FOR INFORMATION OF THE FLAT PANEL IN-WALL BACKBOX. STUB ONE 1.25" CONDUIT TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY.
FP	CEILING DATA COMMUNICATION OUTLET AT FLAT PANEL DISPLAY LOCATION - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT FLUSH IN CEILING.
CP	DATA FOR AV ROOM CONTROL PANEL - PROVIDE ONE DATA DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. NO FACEPLATE. STUB ONE 1" CONDUIT FROM AV BACKBOX TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. SEE EAV DRAWINGS FOR INFORMATION OF THE AV BACKBOX.
RS	DATA FOR AV ROOM SCHEDULING PANEL - PROVIDE ONE DATA DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. NO FACEPLATE. TERMINATE WITH MODULAR JACK IN AV BACKBOX OR CUTOUT FOR GROMMET IN ARCHITECTURAL MULLION. STUB ONE 1" CONDUIT FROM AV BACKBOX OR FROM ARCHITECTURAL MULLION TOABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. SEE EAV DRAWINGS FOR INFORMATION OF THE AV BACKBOX.
F	SYSTEM FURNITURE STANDARD COMMUNICATION OUTLET - PROVIDE THREE DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. COORDINATE WITH THE ARCHITECT AND FURNITURE CONSULTANT FOR MOUNTING HEIGHT.
P	CEILING DATA COMMUNICATION OUTLET FOR PROJECTOR - PROVIDE ONE DATA DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY.
CAM	CEILING DATA COMMUNICATION OUTLET FOR SECURITY CAMERA - PROVIDE ONE DATA DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. COORDINATE WITH ARCHITECT AND SECURITY CONSULTANT FOR EXACT LOCATION.
CAM	WALL DATA COMMUNICATION OUTLET FOR SECURITY CAMERA - PROVIDE ONE DATA DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. COORDINATE WITH ARCHITECT AND SECURITY CONSULTANT FOR EXACT LOCATION.
EP	FIBER COMMUNICATION OUTLET FOR BLUEPHONE - PROVIDE 2-STRAND MULTIMODE OM4 COMPLETE WITH CONNECTOR AND TERMINATION AS REQUIRED. PROVIDE ONE 1.25" CONDUIT. COORDINATE WITH ARCHITECT AND SECURITY CONSULTANT FOR EXACT LOCATION.
F1	SYSTEM FURNITURE COMMUNICATION OUTLET - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. COORDINATE WITH THE ARCHITECT AND FURNITURE CONSULTANT FOR MOUNTING HEIGHT.
FF	FURNITURE FEED FLOOR BOX DEVICE WITH FURNITURE FEED COVER. PROVIDE ONE 1.25" CONDUIT TO CABLE TRAY ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. EXACT LOCATION TO BE COORDINATED BY ARCHITECT.
PT1	FURNITURE FEED POKE-THRU DEVICE WITH FURNITURE FEED COVER. PROVIDE ONE 1.25" CONDUIT TO CABLE TRAY ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. EXACT LOCATION TO BE COORDINATED BY ARCHITECT.
J1	4"x4"x4" JUNCTION BOX. PROVIDE ONE 1.25" CONDUIT TO CABLE TRAY ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. MOUNT AT PROJECT'S STANDARD RECEPTACLE HEIGHT UNLESS NOTED OTHERWISE.
J2	6"x6"x4" JUNCTION BOX. PROVIDE ONE 2" CONDUIT TO CABLE TRAY ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. MOUNT AT PROJECT'S STANDARD RECEPTACLE HEIGHT UNLESS NOTED OTHERWISE.
	19" TELECOMMUNICATIONS RACK.
	TELECOMMUNICATIONS GROUND BUS BAR.
	FIRE RETARDANT .75" PLYWOOD BACKBOARD. PAINTED WITH TWO COATS OF WHITE FIRE RETARDANT PAINT PRIOR TO INSTALLATION. EACH SHEET OF PLYWOOD BACKBOARD SHALL BE 4' WIDE X 8' HIGH.
	TELECOMMUNICATIONS BASKET CABLE TRAY, 12" WIDE x 4" DEEP, UNO. MOUNT ABOVE ACCESSIBLE CEILING. COORDINATE LOCATION WITH DUCTWORK, PLUMBING, FIRE PROTECTION, ELECTRICAL, AND LIGHT FIXTURES.
	TELECOMMUNICATIONS LADDER CABLE RUNWAY. SIZE AS INDICATED ON DRAWINGS.
	EMT CONDUIT CONCEALED IN SLAB OR UNDER FINISHED FLOOR. ROUTE AS INDICATED.
	EMT CONDUIT CONCEALED IN WALL OR ABOVE FINISHED CEILING. ROUTE AS INDICATED.
	EMT CONDUIT STUB UP INTO ACCESSIBLE CEILING UNLESS NOTED OTHERWISE.
	CONDUIT ABOVE CEILING UNLESS NOTED OTHERWISE. CONDUIT SHALL BE CONCEALED.
AFF	ABOVE FINISHED FLOOR
BFC	BELOW FINISHED CEILING
UNO	UNLESS NOTED OTHERWISE
TR	TELECOMMUNICATION ROOM
ER	EQUIPMENT ROOM
TGB	TELECOMMUNICATION GROUNDING BUSBAR
TMGB	TELECOMMUNICATION MAIN GROUNDING BUSBAR
TBB	TELECOMMUNICATION BONDING BACKBONE

CONDUIT INSTALLATION NOTES

THE RACEWAY SYSTEM FOR TELECOM CABLE SHALL FOLLOW THE NEC AND ALL LOCAL CODES GOVERNING THIS PROJECT. ADDITIONAL REQUIREMENTS ARE AS FOLLOWS:

1. A PULL CORD (NYLON, 1/8" MINIMUM) SHALL BE INSTALLED WITHIN ALL CONDUITS.
2. A PULL ROPE (NYLON/POLYESTER, 3/8" MINIMUM) SHALL BE INSTALLED WITHIN ALL OUTSIDE PLANT CONDUITS. MINIMUM TENSILE STRENGTH OF ROPE SHALL BE 2000 LBS PER FOOT.
3. PULL CORD AND PULL ROPE WITHIN ALL CONDUITS SHALL BE RE-PULLED AFTER EACH USE. CONDUITS SHALL NOT REMAIN EMPTY.
4. CONDUIT SHALL RUN IN MOST DIRECT ROUTE POSSIBLE, USUALLY PARALLEL WITH BUILDING LINES.
5. CONDUIT SLEEVES SHOULD BE RIGID GALVANIZED STEEL FOR PENETRATIONS OF CONCRETE SLABS, CONCRETE WALLS. ALL SLEEVES SHALL BE RIGIDLY INSTALLED USING APPROPRIATE FITTINGS AND ALL PENETRATIONS SHALL BE GROUTED AROUND THE SLEEVE. SLEEVES SHALL PROJECT A MINIMUM OF 4" BEYOND WALL OR FLOOR SURFACE. ALL PENETRATIONS SHALL BE FIRESTOPPED.
6. CONDUIT RUN SHALL CONTAIN NO CONTINUOUS SECTIONS LONGER THAN 100 FEET. IF RUNS TOTAL MORE THAN 100 FEET, PULL POINTS OR PULL BOXES SHALL BE INSERTED.
7. CONDUIT RUNS TO WORK AREAS SHALL SERVE NO MORE THAN ONE COMMUNICATION OUTLET. DAISY CHAINING IS NEVER ALLOWED.
8. CONDUIT SHALL HAVE NO MORE THAN TWO 90 DEGREES OF BENDS AT ANY POINT OR MORE THAN 180 DEGREES OF CUMULATIVE BENDS BETWEEN PULL POINTS.
9. INSTALL CONDUITS WITH A MINIMUM OF BENDS AND OFFSETS. BENDS SHALL NOT KINK OR DESTROY INTERIOR CROSS SECTION OF RACEWAY. FACTORY MADE BENDS SHALL BE USED FOR RACEWAY'S 1" TRADE SIZE AND LARGER. BENDS RADIUS SHALL BE 6 TIMES INTERNAL DIAMETER FOR CONDUIT SIZES UP TO 2". A CONDUIT GREATER THAN 2" SHALL HAVE BEND RADIUS AT LEAST 10 TIMES DIAMETER OF CONDUIT. DO NOT USE PULL BOX IN LIEU OF A BEND RADIUS. BEND RADIUS ON CABLING SHOULD ALWAYS BE MADE WITHIN THE CONDUIT.
10. DO NOT INSTALL CONDUIT OVER OR ADJACENT TO BOILERS, INCINERATORS, HOT WATER LINES, OR STEAM LINES.
11. REAM ALL CONDUIT ENDS AND FIT THEM WITH AN INSULATED BUSHING TO ELIMINATE SHARP EDGES THAT MAY DAMAGE CABLES.
12. AFTER INSTALLATION, LEAVE CONDUITS CLEAN, DRY AND UNOBSTRUCTED, REAMED AND FITTED WITH BUSHINGS.
13. ELECTRICAL METALLIC TUBING AND RIGID METAL CONDUIT ARE THE ONLY ALLOWED TYPES FOR INTERIOR BUILDING. FLEXIBLE METAL CONDUIT IS NEVER ALLOWED.
14. CONDUIT SYSTEM INSTALLATION:
    - 14.1 CABLE IN EXTERIOR, ABOVE GRADE LOCATIONS: RIGID GALVANIZED STEEL.
    - 14.2 INTERIOR LOCATIONS: EMT AND RMC.
    - 14.3 CABLE BELOW GRADE: SCHEDULE 40 PVC.
15. ALL METALLIC CONDUITS SHALL BE APPROPRIATELY GROUNDED AS SPECIFIED IN THE NEC, ANSI/TIA/EIA J-STD-607-B AND PER MANUFACTURER'S SPECIFICATIONS.
16. CONDUITS ARE TO BE CLEARLY MARKED AT EACH END TO INDICATE THE TRADE (E.G. AV, TELECOM) THAT THE CONDUIT IS INTENDED TO SUPPORT.
17. CABLE PATHWAY SHOULD BE LESS THAN 270 FEET. THE LENGTH SHALL BE MEASURED FROM THE OUTLET IN THE WORK AREA TO PATCH PANEL IN THE RACK.
18. FOR OUTSIDE PLANT CONDUITS ROUTES PROVIDE A SITE LEVEL ACCESSIBLE HANDHOLE EVERY (2) 90 DEGREE BENDS OR 180 DEGREES IN BENDS TOTAL. DISTANCE BETWEEN EACH HANDHOLE SHALL NOT EXCEED 600 FEET DISTANCE. DO NOT USE HANDHOLE IN LIEU OF A BEND RADIUS. BEND RADIUS ON CABLING SHOULD ALWAYS BE MADE WITHIN THE CONDUIT.
19. OUTSIDE PLANT LOCATIONS, ROUTES, AND PULL POINTS ARE INDICATIVE ONLY. CONTRACTOR TO REVIEW THE PROJECT SITE AND SUBMIT SHOP DRAWING WHICH INCLUDES BUT IS NOT LIMITED TO ROUTES, CONFIGURATION OF CONDUITS, AND DESIGN OF HANDHOLES AND MANHOLES FOR REVIEW BY THE DESIGN TEAM BEFORE COMMENCING WORK.
20. CONTRACTOR TO SUBMIT PRE-CAST HANDHOLE AND MANHOLE PRODUCTS WHICH ARE TO BE INTEGRATED INTO THE OUTSIDE PLANT COMMUNICATIONS DUCTBANK FOR REVIEW BEFORE COMMENCING WORK.
21. CONSTRACTOR SHALL PROVIDE A 2" CONDUIT SLEEVES EXTENDING INTO ACCESSIBLE CEILING AS NECESSARY INTO AREAS AND ROOMS WHERE OUTLET CONDUITS CANNOT EXTEND INTO THE ADJACENT CORRIDOR.

GENERAL PROJECT NOTES

A. ALL MOUNTING HEIGHTS ARE TO THE CENTER LINE OF THE DEVICE BACKBOX UNLESS NOTED OTHERWISE.

B. ALL BOXES AND CONDUITS IN WALLS AND CEILINGS SHALL BE FLUSH MOUNTED OR CONCEALED UNLESS NOTED OTHERWISE.

C. ALL EXTERIOR OUTLETS SHALL BE EXTERIOR RATED OUTLET, IP-67 RATED (NEMA 6).

D. EXACT LOCATION OF ALL TELECOM OUTLETS LOCATED IN FURNITURE AND MILLWORK TO BE VERIFIED WITH ARCHITECT PRIOR TO INSTALLATION.

E. ELECTRICAL OUTLETS SHALL BE PROVIDED WITHIN THREE-SIX INCHES OF COMMUNICATION OUTLETS AT EQUAL HEIGHT.

F. IT SHALL BE UNDERSTOOD ALL INFORMATION WITHIN THIS DRAWING PACKAGE IS DIAGRAMMATIC TO SHOW THE DESIGN INTENT. ANY FIELD DEVIATIONS FROM THE DRAWINGS BY THE CONTRACTOR HOWEVER, SHALL BE SUBMITTED IN WRITING TO THE ARCHITECT OR CONSULTANT. IF FIELD DEVIATIONS ARE NOT SUBMITTED BEFOREHAND, THE INDIVIDUAL CHANGE(S) WILL BE CONSIDERED OUT OF SCOPE FROM THE ARCHITECT AND CONSULTANT'S OVERALL DESIGN AND SPECIFICATION FOR THE PROJECT.

AGENCY APPROVAL:

Chaffey College

HMC Architects

5009006-000

3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

NOT FOR CONSTRUCTION

ISSUE

Δ	DESCRIPTION	DATE
1	DSA APPROVAL	06.17.2021
2	ADDENDUM 2	02.11.2022

KEYNOTES

NOTES

CONSULTANT

waveguide

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Los Angeles, CA 90045
T 310 645-2300 | waveguide.com

FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

TELECOM SYMBOLS AND NOTES

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

SHEET:

T000

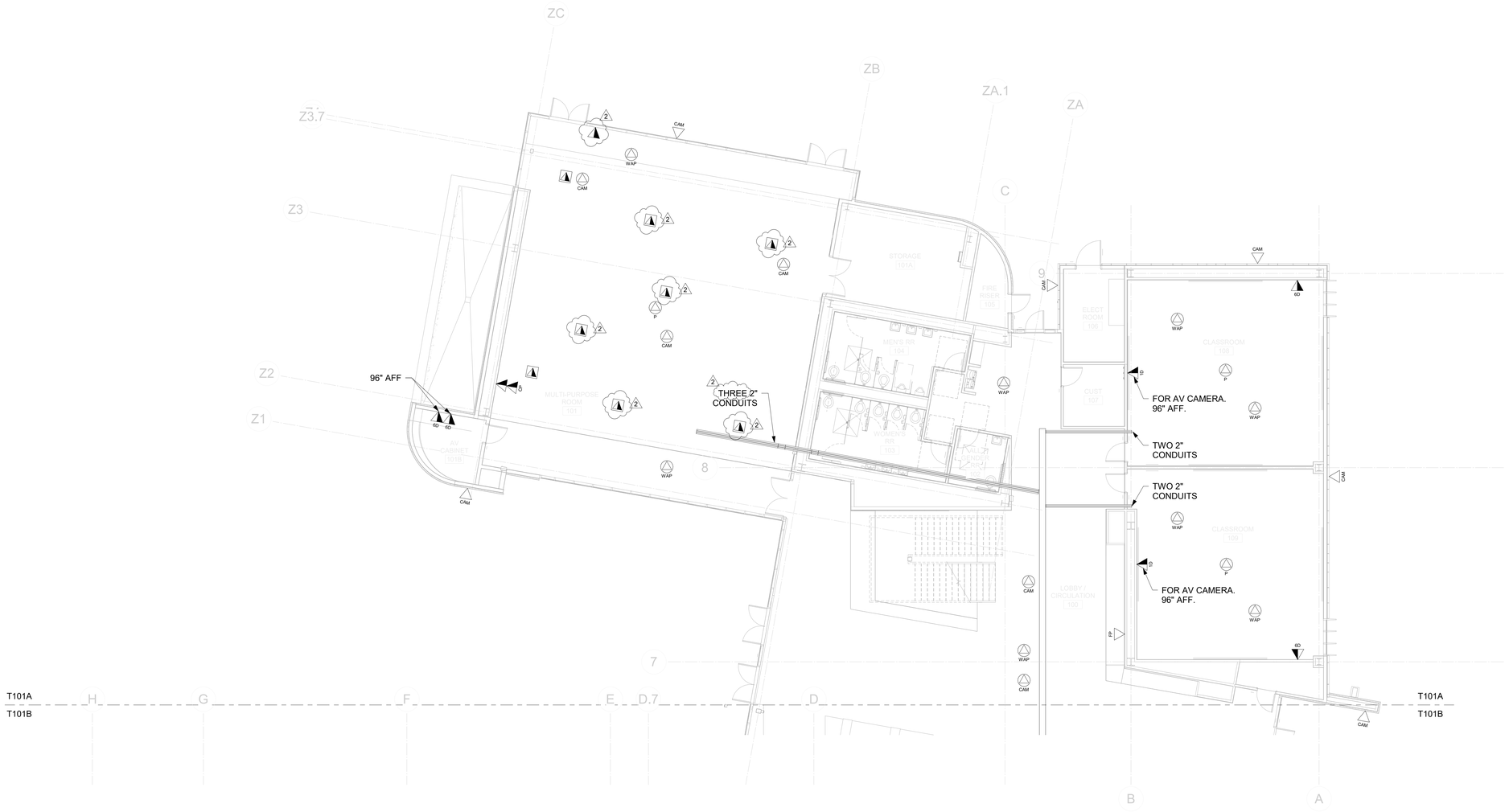
2/9/2022 9:04:14 AM

PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL SPACE SIZE

NOTES (THIS SHEET ONLY):

A. ALL OUTLETS ON THIS FLOOR ARE SERVED FROM BDF 112. TERMINATE ALL CABLES IN BDF 112.



PLEASE RECYCLE

2/9/2022 9:04:17 AM

AGENCY APPROVAL:

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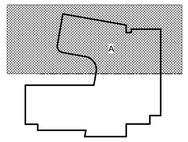
KEY PLAN:



FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

TELECOM 1ST FLOOR PLAN - SEGMENT A

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

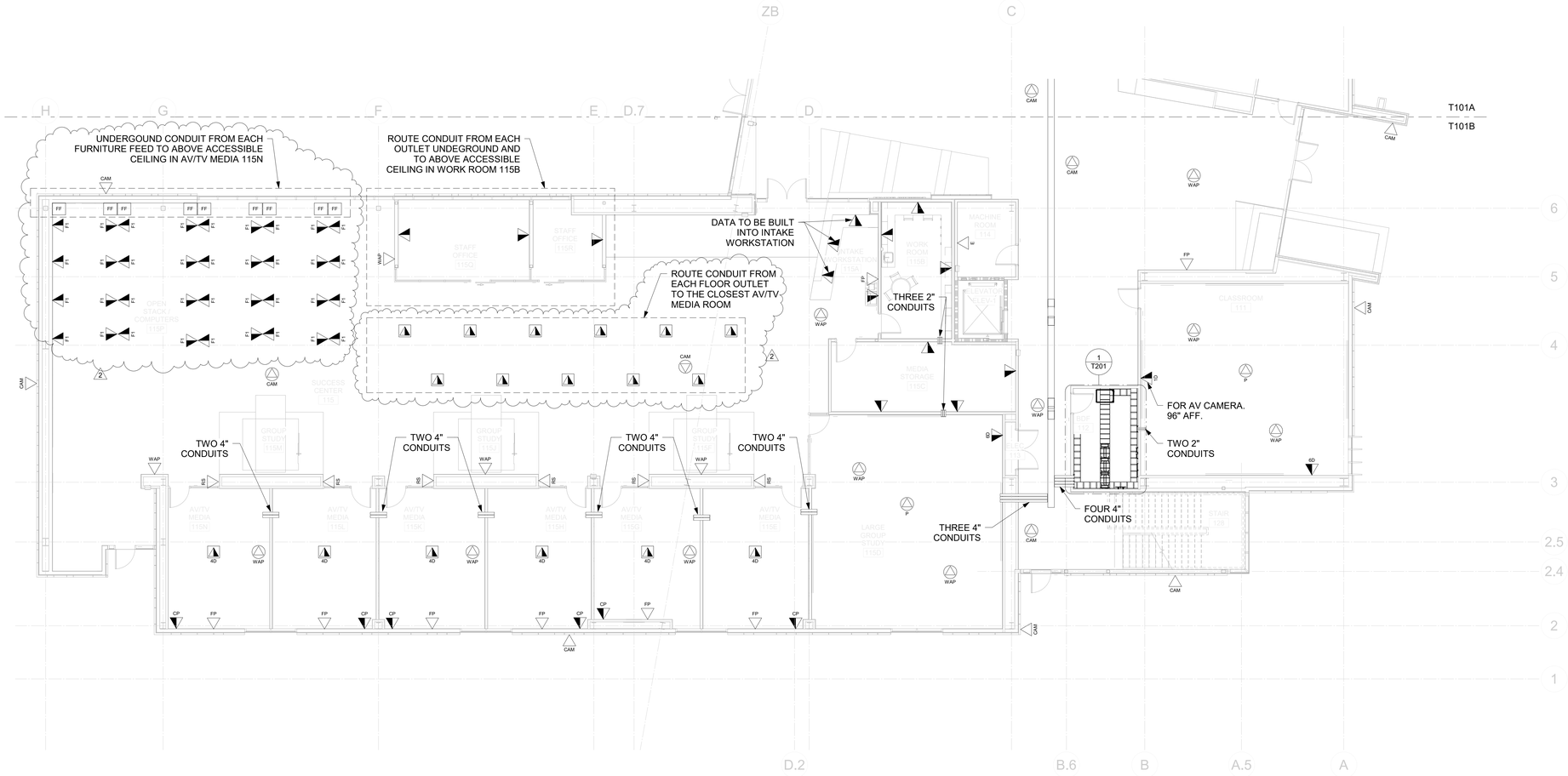
SHEET:

T101A

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL SPACE SIZE

NOTES (THIS SHEET ONLY):

A. ALL OUTLETS ON THIS FLOOR ARE SERVED FROM BDF 112. TERMINATE ALL CABLES IN BDF 112.



AGENCY APPROVAL:

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ONTARIO, CA 91764
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ISSUE

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	DSA APPROVAL	06.17.2021
2	ADDENDUM 2	02.11.2022

KEYNOTES

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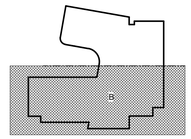
KEY PLAN:



FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

TELECOM 1ST FLOOR PLAN - SEGMENT B

ADDENDUM #2

FILE NO.: **36-C1** A# : **04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

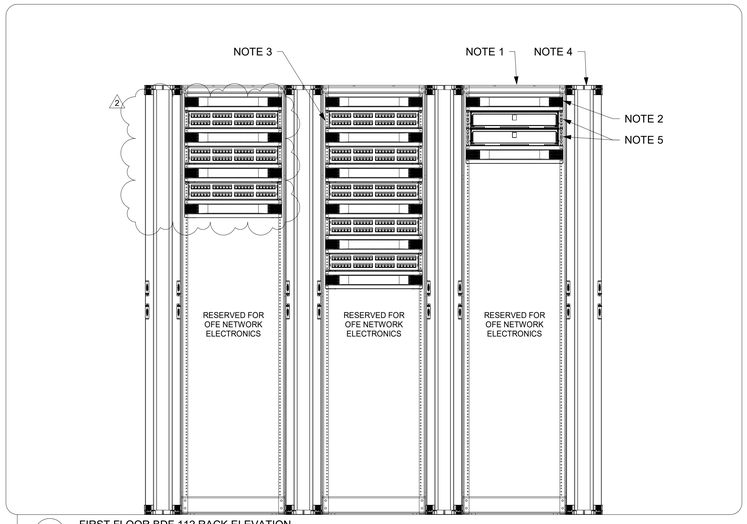
SHEET:

T101B

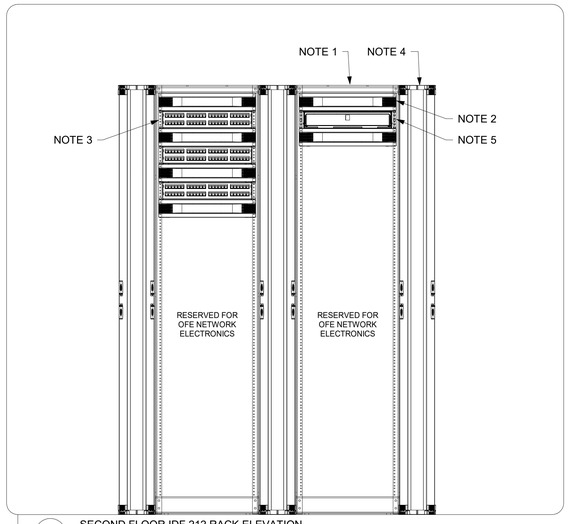
2/9/2022 8:04:21 AM

PLEASE RECYCLE

IF THIS LINE SHOWN ABOVE IS NOT ONE INCH LONG, THIS SHEET IS ORIGINAL SIZE SCALE



1 FIRST FLOOR BDF 112 RACK ELEVATION
NTS



2 SECOND FLOOR IDF 212 RACK ELEVATION
NTS

SHEET NOTES (THIS SHEET ONLY)

1. TELECOMMUNICATION EQUIPMENT RACK.
2. HORIZONTAL CABLE MANAGEMENT.
3. 48-PORT DATA PATCH PANEL.
4. 6" DOUBLE SIDED VERTICAL CABLE MANAGEMENT.
5. FIBER OPTIC PATCH PANEL.

AGENCY APPROVAL:

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KEYNOTES

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FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

TELECOM RACK ELEVATIONS

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

SHEET:

T202

2/8/2022 9:04:23 AM

PLEASE RECYCLE

HMC ARCHITECTS
3546 Concours Street
Ontario, California 91764

CHAFFEY COLLEGE
5885 Haven Avenue,
Rancho Cucamonga, CA 91737-3002

February 11, 2022

Measure P, Chaffey College – Chino Instructional Building
Project No.2022PW01
DSA # 04-119722
File # 36-C1

ADDENDUM NO. 2
NARRATIVE

The following changes, additions, deletions, or corrections shall become a part of the Contract Documents for the project named above and all other conditions shall remain the same. The bidders shall be responsible for transmitting this information to all affected subcontractors and suppliers prior to the closing of bids.

SPECIFICATIONS

Item No. AD-2.01: Reference Revised Specifications

A. The following revised/added specifications dated February 11, 2022, are hereby issued to replace those dated August 5, 2021. Contractor is to replace each referenced section in its entirety with the attached TOC and modified specifications sections. Contractor to also add the new specifications as referenced in the TOC. References to individual changes in the narrative below are for reference only, the Contractor is to conform with all provisions in the new and modified specifications.

TOC TABLE OF CONTENTS

- Revised Table of Contents pages 3 & 5 to reflect the addition of the following specification sections:
  - 22 08 00 – COMMISSIONING OF PLUMBING
  - 26 08 00 – COMMISSIONING OF ELECTRICAL SYSTEMS
  - 26 11.16.12 – SECONDARY UNIT SUBSTATION WITH SWITCHBOARD SECONDARY

05 12 00 STRUCTURAL STEEL FRAMING

- Section 1.06.A & B – updates to fabricator and installer qualifications

05 50 00 METAL FABRICATIONS

- Section 2.05F – revised safety stair nosing requirements

07 21 00 INSULATION

- Section 2.03 – eliminate requirement for between insulation between floors

07 26 16 VAPOR BARRIER

- Section 1.04E.2 – revise requirements for manufacturer's review

07 62 00 SHEET METAL FLASHING AND TRIM

- Section 3.03A – revise requirements for Field Quality Control requirements
- Section 3.03P – removed duplicate bracket
- Section 3.03S – revise requirement for plaster reveals

07 95 13 EXPANSION JOINT COVER ASSEMBLIES

- Section 3.05A – revise requirements for Field Quality Control requirements

08 12 13 HOLLOW METAL FRAMES - WELDED

- Section 2.02A – revise requirements for welded frames
- Section 2.03A & B – revise requirements for protective coatings

08 13 13 HOLLOW METAL DOORS

- Section 2.02 – revise requirements for doors
- Section 2.04B – add protective coating requirement for exterior doors

08 14 16 FLUSH WOOD DOORS

- Section 2.03A – revise glass stop requirements

08 41 13 ALUMINUM ENTRANCES AND STOREFRONTS

- Section 3.04B.2 – additional requirements for Water-Spray Test

08 62 70 TUBULAR DAYLIGHTING DEVICE

- Section 3.04 – additional requirements for field quality control

08 63 00 TRANSLUCENT ROOF ASSEMBLY

- Section 3.03 – additional requirements for field quality control

08 80 00 GLAZING

- Section 2.02A.1.a.1, 2.02B.1.a.1, 2.02C.1.a.1, 2.02D.1.a.1 – revise requirements for glazing

09 90 00 PAINTING

- Section 1.03F – revise requirements for closeout submittals
- Section 1.04A – revise requirements for maintenance materials and submittals

12 59 17 WALL SYSTEMS FURNITURE

- Section 2.05J, K, & L – update door component requirements

22 08 00 COMMISSIONING OF PLUMBING

- Add specification section in its entirety

22 11 23 DOMESTIC WATER PUMPS

- Section 2.01A.3 – model number revised

23 31 13 HVAC METAL DUCTS

- Section 3.13 – Duplicate section deleted

23 33 00 HVAC DUCT ACCESSORIES
- Section 21.03B – LEED requirement deleted

26 08 00 COMMISSIONING OF ELECTRICAL SYSTEMS
- Add specification section in its entirety

26 11 16.12 SECONDARY UNIT SUBSTATIONS WITH SWITCHBOARD SECONDARY
- Add specification section in its entirety

31 23 00 EARTHWORK
- Section 1.02 – section removed
- Section 3.22A – revise requirements for disposal

31 23 33 TRENCHING, BACKFILLING, AND COMPACTION
- Section 1.05 – section removed

32 31 13 CHAIN LINK FENCE AND GATES
- Section 2.01E – table updated

32 84 00 IRRIGATION
- Section 3.3B.4 – revised requirements

32 93 00 PLANTING
- Section 2.10A – revised requirements for wood stakes

33 05 00 INSTALLATION OF BURIED PIPE
- Section 1.04 - section removed

33 14 00 HYDROSTATIC TESTING OF PRESSURE PIPELINES
- Section 1.04 - section removed

DRAWINGS

Item No. AD-3.02: Reference Revised Drawings

A. The following revised/added drawing sheets dated February 11, 2022, are hereby issued to replace those dated August 5, 2021. Contractor is to replace each sheet in its entirety with the attached modified drawing sheets.

CIVIL

C2.00 HORIZONTAL CONTROL PLAN
- Updated detail refence in legend.

C3.00 GRADING PLAN
- Updated detail refences in legend & Construction Note 7

C4.00 UTILITY PLAN

- Updated callouts on drawing and updated detail references on Construction Notes

LANDSCAPE

L1.00 MASTER CONSTRUCTION SCHEDULE AND NOTES

- Revised selections for finish & color, and reference legend.

L1.01 CONSTRUCTION PLAN ENLARGEMENT

- Revised information on reference legend

L1.02 CONSTRUCTION PLAN ENLARGEMENT

- Revised information on reference legend

L1.51 CONSTRUCTION PLAN ENLARGEMENT

- Revised notes on details

L1.52 CONSTRUCTION PLAN ENLARGEMENT

- Revised notes on details

L1.53 CONSTRUCTION PLAN ENLARGEMENT

- Revised notes on details

L2.00 CONSTRUCTION PLAN ENLARGEMENT

- Revised model on irrigation legend

L2.51 CONSTRUCTION PLAN ENLARGEMENT

- Revised details

L2.52 CONSTRUCTION PLAN ENLARGEMENT

- Detail removed

L3.00 PLANTING SCHEDULE AND NOTES

- Revised quantities and notes on planting legend

L3.51 PLANTING DETAILS

- Revised notes on details

ARCHITECTURAL

A4.11A ROOF PLAN - SEGMENT A

- Added detail references

A4.11B ROOF PLAN - SEGMENT B

- Added detail references

A5.11 EXTERIOR ELEVATIONS

- Revised door heights

A5.22 EXTERIOR INSULATED METAL PANEL ELEVATIONS

- Revised door heights

A6.12 BUILDING SECTIONS

- Revised notes on building sections

A6.13 BUILDING SECTIONS

- Revised notes on building sections

A8.11 INTERIOR ELEVATIONS - FIRST FLOOR

- Revised notes on interior elevations

A8.21 INTERIOR ELEVATIONS - SECOND FLOOR

- Revised door heights

A9.11 DOOR SCHEDULE

- Revised door heights

A10.01 SITE DETAILS

- Detail 9/A10.01- foundation for pole lights added.

A10.16 WALL DETAILS – DRIFT JOINTS

- Revised callouts & dimension added to details

A10.17 PLANTER DETAILS

- Revised callouts & dimension added to details

A10.51 STAIR DETAILS

- Revised callouts on details

A10.62 MILLWORK DETAILS

- Dimension added to details

STRUCTURAL

S2.10A 1ST FLOOR FOUNDATION – SEGMENT A

- References to AESS steel added
-

S2.10B 1ST FLOOR FOUNDATION – SEGMENT B

- References to AESS steel added

S9.01 ENLARGED STAIR-1 PLANS AND SECTIONS

- References to AESS steel added

S9.02 ENLARGED STAIR-2 PLANS AND SECTIONS

- References to AESS steel added

PLUMBING

P0.01 PLUMBING LEGEND, ABBREBIATIONS, AND GENERAL NOTES

- Revised plumbing general notes

P0.02 DETAILS

- Revisions to schedules

ELECTRICAL

E0.02 ELECTRICAL LEGEND
- New symbol added

E3.11A ELECTRICAL POWER PLAN – FIRST FLOOR – SEGMENT A
- Revised location & quantity of electrical outlets & floor boxes
- Added dimensions/locations of electrical outlets

E3.11B ELECTRICAL POWER PLAN – FIRST FLOOR – SEGMENT B
- Revised location, type & quantity of electrical outlets & floor boxes.
- Added dimensions/locations of electrical outlets
- Added Construction Note #16

E3.12A ELECTRICAL POWER PLAN – SECOND FLOOR – SEGMENT A
- Added dimensions/locations of electrical outlets

E3.12B ELECTRICAL POWER PLAN – SECOND FLOOR – SEGMENT B
- Added dimensions/locations of electrical outlets

E7.01 PANEL SCHEDULE
- Revisions to panel schedule

TELECOM

T000 TELECOM SYMBOLS AND NOTES
- Revised symbols

T101A TELECOM 1ST FLOOR PLAN – SEGMENT A
- Added dimensions/locations of telecom floor boxes
-

T101B TELECOM 1ST FLOOR PLAN – SEGMENT B
- Added dimensions/locations of telecom floor boxes
-

T202 TELECOM RACK ELEVATIONS
- Revised rack elevations

HMC ARCHITECTS
3546 Concours Street
Ontario, California 91764

CHAFFEY COLLEGE
5885 Haven Avenue,
Rancho Cucamonga, CA 91737-3002

February 11, 2022

Measure P, Chaffey College – Chino Instructional Building
Project No.2022PW01
DSA # 04-119722
File # 36-C1

ADDENDUM NO. 2
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- Revised notes on details

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L2.51 CONSTRUCTION PLAN ENLARGEMENT

- Revised details

L2.52 CONSTRUCTION PLAN ENLARGEMENT

- Detail removed

L3.00 PLANTING SCHEDULE AND NOTES

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L3.51 PLANTING DETAILS

- Revised notes on details

ARCHITECTURAL

A4.11A ROOF PLAN - SEGMENT A

- Added detail references

A4.11B ROOF PLAN - SEGMENT B

- Added detail references

A5.11 EXTERIOR ELEVATIONS

- Revised door heights

A5.22 EXTERIOR INSULATED METAL PANEL ELEVATIONS

- Revised door heights

A6.12 BUILDING SECTIONS

- Revised notes on building sections

A6.13 BUILDING SECTIONS

- Revised notes on building sections

A8.11 INTERIOR ELEVATIONS - FIRST FLOOR

- Revised notes on interior elevations

A8.21 INTERIOR ELEVATIONS - SECOND FLOOR

- Revised door heights

A9.11 DOOR SCHEDULE

- Revised door heights

A10.01 SITE DETAILS

- Detail 9/A10.01- foundation for pole lights added.

A10.16 WALL DETAILS – DRIFT JOINTS

- Revised callouts & dimension added to details

A10.17 PLANTER DETAILS

- Revised callouts & dimension added to details

A10.51 STAIR DETAILS

- Revised callouts on details

A10.62 MILLWORK DETAILS

- Dimension added to details

STRUCTURAL

S2.10A 1ST FLOOR FOUNDATION – SEGMENT A

- References to AESS steel added
-

S2.10B 1ST FLOOR FOUNDATION – SEGMENT B

- References to AESS steel added

S9.01 ENLARGED STAIR-1 PLANS AND SECTIONS

- References to AESS steel added

S9.02 ENLARGED STAIR-2 PLANS AND SECTIONS

- References to AESS steel added

PLUMBING

P0.01 PLUMBING LEGEND, ABBREBIATIONS, AND GENERAL NOTES

- Revised plumbing general notes

P0.02 DETAILS

- Revisions to schedules

ELECTRICAL

E0.02 ELECTRICAL LEGEND
- New symbol added

E3.11A ELECTRICAL POWER PLAN – FIRST FLOOR – SEGMENT A
- Revised location & quantity of electrical outlets & floor boxes
- Added dimensions/locations of electrical outlets

E3.11B ELECTRICAL POWER PLAN – FIRST FLOOR – SEGMENT B
- Revised location, type & quantity of electrical outlets & floor boxes.
- Added dimensions/locations of electrical outlets
- Added Construction Note #16

E3.12A ELECTRICAL POWER PLAN – SECOND FLOOR – SEGMENT A
- Added dimensions/locations of electrical outlets

E3.12B ELECTRICAL POWER PLAN – SECOND FLOOR – SEGMENT B
- Added dimensions/locations of electrical outlets

E7.01 PANEL SCHEDULE
- Revisions to panel schedule

TELECOM

T000 TELECOM SYMBOLS AND NOTES
- Revised symbols

T101A TELECOM 1ST FLOOR PLAN – SEGMENT A
- Added dimensions/locations of telecom floor boxes
-

T101B TELECOM 1ST FLOOR PLAN – SEGMENT B
- Added dimensions/locations of telecom floor boxes
-

T202 TELECOM RACK ELEVATIONS
- Revised rack elevations

TABLE OF CONTENTS

DIVISION 08 - OPENINGS

DIVISION 09 - FINISHES

DIVISION 10 - SPECIALTIES

DIVISION 11 - EQUIPMENT

DIVISION 12 - FURNISHINGS

DIVISION 14 - CONVEYING EQUIPMENT

DIVISION 21 - FIRE SUPPRESSION

DIVISION 22 - PLUMBING

2

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING(HVAC)

DIVISION 25 - INTEGRATED AUTOMATION

DIVISION 26 - ELECTRICAL

END OF TABLE OF CONTENTS

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

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. Structural steel.
   2. Grout.

B. Related Sections:
   1. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
   2. Division 05 Section "Metal Fabrications" for miscellaneous steel fabrications and other metal items not defined as structural steel.
   3. Division 05 Section "Metal Stairs."
   4. Division 09 painting Sections and Division 09 Section "High-Performance Coatings" for surface-preparation and priming requirements.

1.03 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SFRS" or elements along grid lines designated as "SFRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:
   1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
   2. Welded built-up members with plates thicker than 2 inches (50 mm).
   3. Column base plates thicker than 2 inches (50 mm).

D. Protected Zone: Structural members or portions of structural members of the SFRS indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:
   1. Product Data for MR Credit 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Laboratory Test Reports for IEQ Credit 4.2: For primers, 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", including 2004 Addenda.

C. Shop Drawings: Show fabrication of structural-steel components.
   1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
   2. Include embedment drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
   4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
   5. Identify members and connections of the seismic-load-resisting system.
   6. Indicate locations and dimensions of protected zones.
   7. Identify demand critical welds.

D. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing. For demand critical welds include the following:
   1. One or more combination of welding variables (e.g. power source, volt, amp, travel speed, etc.) that produces heat input within the range used for the WPS Heat Input Envelope Test.
   2. Electrode manufacturer and trade name.

E. Mock-ups: Where indicated in architectural drawings, for steel exposed to view in the completed structure, construct mockups for each form of construction and finish required to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
   1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
   2. Notify Architect one week in advance of the dates and times when mockups will be constructed.
   3. Demonstrate the proposed range of aesthetic effect and workmanship of steel surfaces and welded and bolted connections.
      a. Coordinate finish-painting requirements of mockups with Division 09 Section "Painting."

4. Obtain Architect's approval of mockups before start of final unit of Work.
5. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   a. When directed, demolish and remove mockups from Project site.
   b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

F. Source quality-control reports.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that ~~participates in~~ follows the requirements of ~~the AISC Quality Certification Program and is designated an AISC Certified Plant, Category STD.~~ All requirements of the 2019 CBC shall apply. 2

B. Installer Qualifications: A qualified installer who ~~participates in~~ follows the requirements of ~~the AISC Quality Certification Program and is designated an AISC Certified Erector, Category ACSE.~~ All requirements of the 2019 CBC shall apply. 2

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

D. Comply with applicable provisions of the following specifications and documents:
1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 358.
4. AISC 360.

5. RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
6. AWS D1.1/D1.1M.
7. AWS D1.8/D1.8M.

E. Preinstallation Conference: Conduct conference at Project site.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
1. Fasteners may be repackaged provided Owner's Testing Agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.08 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:
1. W-Shapes: 60 percent.
2. Channels, Angles, M, S-Shapes: 60 percent.
3. Plates and Bars: 25 percent.
4. Cold-Formed Hollow Structural Sections: 25 percent.
5. Steel Pipe: 25 percent.
6. All Other Steel Materials: 25 percent.

B. W-Shapes: ASTM A 992/A 992M.

C. Channels, Angles, M-, S-Shapes: ASTM A 36/A 36M.

D. Plates and Bars: ASTM A 36/A 36M, typical; ASTM A 572/A 572M, Grade 50, when used in SLRS connection.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade C typical & ASTM A1085 where specifically indicated.

F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
   1. Finish: Black [except where indicated to be galvanized].

G. Welding Electrodes: Comply with AWS requirements.

H. Structural Steel Surfaces: For fabrication of work which will be exposed to view in the completed structure, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

2.02 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish; where indicated on Drawings.
   1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.
   1. Finish: Hot-dip or mechanically deposited zinc coating. All threaded components of the fastener assembly must be galvanized by the same process. Mixing high-strength bolts that are galvanized by one process with nuts that are galvanized by the other is not permitted.
   2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex or round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Plain.

E. Shear Connectors: ASTM A 29, Grades C1010 through C1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Headed Anchor Rods: ASTM F 1554, Grade 36, typical; ASTM F 1554, Grade 55, weldable, when used in SFRS; straight.
1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
4. Finish: Plain.

G. Threaded Rods: ASTM A 36/A 36M.
1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
3. Finish: Plain.

H. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.03 PRIMER

A. Low-Emitting Materials: Paints and coatings 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”, including 2004 Addenda.

B. Primer: Comply with Division 09 painting Sections and Division 09 Section "High-Performance Coatings."

C. Primer: SSPC-Paint 25, Type II, zinc oxide, alkyd, linseed oil primer.

D. Galvanizing Repair Paint: ASTM A 780.

2.04 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.05 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.

3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

H. Steel that will be exposed to view in the completed structure:
1. The fabricator shall handle the steel with care to avoid marking or distorting the steel members:
   a. Slings shall be nylon type or chains or wire rope with softeners.
   b. Care shall be taken to minimize damage to any shop paint or coating.
   c. Tack welds, temporary braces, backing, and fixtures used in fabrication shall be shown in the fabrication documents.
   d. When temporary braces or fixtures are required during fabrication or shipment, or to facilitate erection, care shall be taken to avoid blemishes or unsightly surfaces resulting from the use or removal of such temporary elements.
   e. Tack welds not incorporated into final welds shall be treated consistently with requirements for final welds.
   f. All backing and runoff tabs shall be removed and the welds ground smooth.
   g. All bolt heads in connections shall be on the same side and consistent from one connection to another.
2. Members fabricated of unfinished and galvanized steel shall not have erection marks, painted marks or other marks on surfaces in the completed structure.

3. The permissible tolerances for member depth, width, out of square, and camber and sweep shall be as specified in ASTM A6 and ASTM A500.
4. Weld spatter exposed to view, if any, shall be removed.
5. Weld projection up to 1/16 in (2mm) is acceptable for butt and plug welded joints.
6. Weld show-through shall be acceptable as produced.
7. Surface shall be prepared to meet the requirement of SSPC-SP 6. Prior to blast cleaning:
   a. Grease or oil, if any is present, shall be removed by solvent cleaning to meet the requirements of SSPC-SP 1.
   b. Weld spatter, slivers, and similar surface discontinuities shall be removed.
   c. Sharp corners resulting from shearing, flame cutting, or grinding shall be eased.
8. Seams of hollow structural sections shall be acceptable as produced.
9. Delivery of Materials: The standard for acceptance of delivered and erected members shall be equivalent to the standard employed at fabrication. Fabricator shall use special care to avoid bending, twisting or otherwise distorting steel members that will be exposed to view in the completed structure. All tie downs on loads shall be nylon straps or chains with softeners to avoid damage to edges and surfaces of members.

2.06 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened unless noted otherwise on Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.07 SHOP PRIMING

A. Shop prime steel surfaces except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
   2. Surfaces to be field welded.
   3. Top flange of beams supporting steel decking.
   4. Surfaces to be high-strength bolted with slip-critical connections.
   5. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
   6. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. SSPC-SP 2, "Hand Tool Cleaning."
   2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.08 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
   1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Determine, furnish and install all temporary supports, such as temporary guys, beams, braces, falsework, cribbing or other elements required for the erection operation. These temporary supports shall be sufficient to secure the bare structural steel framing or any portion thereof against loads that are likely to be encountered during erection, including those due to wind and those that result from erection operations. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.03 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

4. On welded construction exposed to view or weather, remove erection bolts, fill holes with plug welds or filler and grind smooth at exposed surfaces.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

I. Steel members that will be exposed to view in completed structure: The erector shall use special care in unloading, handling and erecting steel members that will be exposed to view in the completed structure to avoid marking or distorting. The erector shall plan and execute all operations in such a manner that allows the appearance of these members to be maintained:
1. Slings shall be nylon type or chains or wire rope with softeners.
2. Care shall be taken to minimize damage to any shop paint or coating.
3. When temporary braces or fixtures are required to facilitate erection, care shall be taken to avoid any blemishes, holes or unsightly surfaces resulting from the use or removal of such temporary elements.
4. Tack welds not incorporated into final welds shall be ground smooth.
5. All backing and runoff tabs shall be removed and the welds ground smooth.
6. All bolt heads in connections shall be on the same side and consistent from one connection to another.

3.04 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened unless noted otherwise on Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
   2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
   3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.05 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent Testing Agency to inspect field welds and high-strength bolted connections and prepare test reports.

B. Inspections: Verify and inspect structural steel Work as shown on Drawings.

C. Bolted Connections: Bolted connections will be tested and inspected according to RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
   1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at Testing Agency's option:

      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
      c. Ultrasonic Inspection: ASTM E 164.

E. SFRS Connections: Test and inspect SFRS connection elements as indicated in accordance to AISC 341, AWS D1.1/D1.1M and AWS D1.8/D1.8M.

F. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
   1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Testing Agency, where warranted, may select a reasonable number of additional studs to be subjected to the bend tests.

G. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.06 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated ferrous metal items, galvanized and prime painted.

B. Stainless steel metal items.

C. Aluminum metal items.

D. Related Sections:
1. Section 05 52 00, Handrails and Railings.
2. Section 09 90 00, Painting.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. American Society of Mechanical Engineers (ASME)
1. ASME B18 -Fasteners

C. ASTM International
1. ASTM A36/A36M Carbon Structural Steel
2. ASTM A48/A48M Gray Iron Castings
3. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless
4. ASTM A123 Zinc (Hot-Dip Galvanized) on Coatings on Iron and Steel Products
5. ASTM A153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware
6. ASTM A240 Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.
7. ASTM A276 Stainless Steel Bars and Shapes
8. ASTM A283/A 283M Low and Intermediate Tensile Strength Carbon Steel Plates
9. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
10. ASTM A325 - Structural Bolts, Steel, Heat Treated, 120/105ksi Minimum Tensile Strength
11. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes
12. ASTM A513 - Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
13. ASTM A563 - Carbon and Alloy Steel Nuts
14. ASTM A653/A 653M Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
15. ASTM A666 Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar (non magnetic).

16. ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
17. ASTM A786/A 786M Rolled Steel Floor Plates
18. ASTM A793 Rolled Floor Plate, Stainless Steel.
19. ASTM A992 Structural Steel Shapes
20. ASTM B26 Aluminum-Alloy Sand Castings
21. ASTM B308 Aluminum-Alloy 6061-T6 Standard Structural Profiles
22. ASTM B209/B209M Aluminum and Aluminum-Alloy Sheet and Plate
23. ASTM B221/B221M Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
24. ASTM B455 Copper-Zinc-Lead Alloy (Leaded Brass) Extruded Shapes
25. ASTM B632/B632M Aluminum-Alloy Rolled Tread Plate
26. ASTM B633 - Electrodeposited Coatings of Zinc on Iron and Steel
27. ASTM C1107 - Packaged Dry Hydraulic - Cement Grout (Non-Shrink
28. ASTM D520 ASTM D520 - Zinc Dust Pigment
29. ASTM F 593 - Stainless Steel Bolts, Hex Cap Screws, and Studs
30. ASTM F 594 Stainless Steel Nuts
31. ASTM F 738M Stainless Steel Metric Bolts, Screws, and Studs
32. ASTM F 836M Stainless Steel Metric Nuts
33. ASTM F1554 - Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

D. American Welding Society (AWS)
1. AWS A2.4 - Standard Symbols for Welding, Brazing and Non-Destructive Examination
2. AWS A5.1 - Carbon Steel Covered Arc-Welding Electrodes

E. ASCE/SEI 7-16 - American Society of Civil Engineers, Structural Engineers Institute, ASCE Standard.

F. California Code of Regulations (CCR)
1. Title 8, Chapter 3.2
2. Title 8, Division 1, Subchapter 7, Group 1, Article 4, Section 3277, Fixed Ladders
3. Cal/OSHA, Subchapter 4 Construction Safety Orders
4. Title 24, Part 2, 2019 California Building Code (CBC), Chapter 22A.
5. Title 24, California Fire Code Chapter 35 Welding and Other Hot Work.

G. National Ornamental & Miscellaneous Metals Association (NOMMA)
1. NOMMA Guidelines - Guideline 1 Joint Finishes

H. SSPC - The Society for Protective Coatings
1. Paint 20 - Zinc-Rich Coating (Type 1 Inorganic and Type II Organic)
2. SP-2 - Steel Preparation

I. MIL - Military Specifications, United States Department of Defense
1. P-21035 - Paint, High Zinc Dust Content, Galvanizing Repair

J. MPI - Master Painters Institute Approved Products List
1. 18 - Primer, Zinc Rich, Organic
2. 19 - Primer, Zinc Rich, Inorganic

1.03 SUBMITTALS

A. Shop Drawings. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories. Include erection drawings, elevations and details where applicable. Indicate welded connections using standard AWS A2.4 Welding Symbols. Indicate net weld lengths.

B. Welder Certifications.

C. Manufacturer's Certificates certifying welders employed on the work have been AWS qualified within the previous 12 months, in accordance with AWS-WHB-1.

D. Written Welding Procedure Specification (WPS)

1.04 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following
1. AWS D1.1, Structural Welding Code--Steel.
2. AWS D1.3, Structural Welding Code--Sheet Steel.
3. AWS D1.8, Structural Welding Code – Seismic Supplement.
4. AWS Certified welders.
5. AWS D1.6, Structural Welding Code--Stainless Steel.
6. AWS D1.2, Structural Welding Code--Aluminum.
7. AWS - American Welding Society
8. AWS A2.4 Standard Symbols for Welding, Brazing and Non Destructive Examination
9. DSA-Projects: All welding shall be specially inspected by an AWS-CWI Qualified Inspector.

B. Coating applicator - Galvanized Metal Fabrications: Company specializing in hot-dip galvanizing after fabrication and following the procedures in the Quality Assurance Manual of the American Galvanizers Association.

1.05 FIELD MEASUREMENTS

A. Verify field measurements.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.02 FERROUS METALS

A. Steel Sections: ASTM A992 for W-Shape sections and ASTM A36 for all other members.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Bending or cold-formed steel: ASTM A283, Grade C.

D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars ASTM A666, Type 304L, No. 4 satin finish, 16 gauge minimum, unless otherwise indicated.

E. Stainless-Steel Sheet, Strip, Plate, and Flat Bars ASTM A240, Type 304L, Commercial Grade No. 4 finish, 16 gauge minimum, unless otherwise indicated. Stretcher-leveled standard of flatness for countertops.

F. Stainless-Steel Bars and Shapes ASTM A276, Type 304L.

G. Rolled-Stainless-Steel Floor Plate ASTM A793.

H. Steel Round Structural Tubing: ASTM A500, Grade C, minimum yield strength, 46 ksi.

I. Structural Tubing: Hollow Structural Sections (HSS), ASTM A500, Grade B, minimum yield strength, 42 ksi.

J. Pipe: ASTM A53, Grade B, Type E or S, Schedule 40, galvanized where indicated.

K. Cast Iron: ASTM A48/A48M, Class 30, unless another class is indicated or required by structural loads.

L. Cast steel: ASTM A27, Grade 65-35.

M. Square and rectangular steel tubing structural: carbon steel conforming to ASTM A500 or ASTM A36.

N. Mechanical Tubing: ASTM A 513 hot- or cold-rolled carbon steel for non-structural tubing, electric welded tubing.

2.03 NONFERROUS METALS

A. Aluminum Standard Structural Profiles: ASTM B308, Alloy 6061-T6.

B. Aluminum Plate and Sheet ASTM B209/, Alloy 6061-T6.

C. Aluminum Extrusions ASTM B221/, Alloy 6063-T6.

D. Aluminum-Alloy Rolled Tread Plate ASTM B632/B632M, Alloy 6061-T6.

E. Aluminum Castings ASTM B26/B26M, Alloy 443.0-F.

2.04 FASTENERS

A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563 and ANSI B18.2.1; and, where indicated, flat washers and ASTM A325 as indicated on drawings.

C. Stainless-Steel Bolts and Nuts - Corrosion Grade: Regular hexagon-head annealed stainless steel bolts, nuts and, where indicated, flat washers; ASTM F593 for bolts and ASTM F594/ for nuts, Alloy Group 1 [Group 2].
   1. Stainless Steel Fastenings and Fittings at Food Preparation areas:
      a. Bolts and screws with countersunk flat heads at interior and exterior visible or accessible surfaces.
      b. Use concealed fastenings where possible.

D. High Strength Bolts ASTM A325.

E. Anchor Bolts ASTM F1554, Grade 36.

F. Machine Screws ASME B18.6.3.

G. Lag Bolts ASME B18.2.1.

H. Wood Screws Flat head, carbon steel, ASME B18.6.1.

I. Plain Washers Round, carbon steel, ASME B18.22.1.

J. Lock Washers Helical, spring type, carbon steel, ASME B18.21.1.

K. Eyebolts: for wood, steel or concrete construction, Stainless steel Type 304. 1/4" shoulder pattern, rated 500 lbs. minimum. Epoxied in Concrete where indicated.

L. Threaded rods, steel yokes and plates.

M. Self-drilling, self-tapping screws, ASTM C954, galvanized, minimum #10 unless noted otherwise on drawings. By Buildex/Tomarco or equal.

N. Anchorage Devices, Drilled Expansion Anchors Minimum 5/8-inch diameter with 3 inch embedment unless noted otherwise on drawings. Allowable shear and tension values as permitted in ICC-ES, ESR-1917 Hilti Kwik Bolt TZ Concrete Anchor or Hilti Kwik Bolt 3, ESR-1385 for masonry anchors, by Hilti Inc., Tulsa, OK, or in ICC-ES 2502, DeWalt Power-Stud+SD2 concrete anchor or DeWalt Power-Stud+ SD1, ESR-2966 for masonry anchors, by Dewalt, Towson, MD.

2.05 MISCELLANEOUS MATERIALS

A. Shop Primer: Fabricator's rust inhibitive primer suitable for finish scheduled in Section 09 90 00 equal to L69 Hi Build Epoxoline II @ 3-4 mils DFT primer, red color, air dried, by Tnemec.

B. Galvanizing Repair Compound: ASTM D520 Type III, MIL-P-21035, SSPC-Paint 20, or MPI #18 or 19. Touch-Up products for Galvanized Surfaces Ready mixed Zinc rich galvanizing compound, 95% zinc.

1. Finish: Galvilite by ZRC Products Company, Marshfield, MA or equal. Reflective Metallic Sheen for exposed galvanized finish.
2. Finish: ZRC Products Company, Marshfield, MA or equal. Primer for repaired galvanized to receive a painting finish.

C. Zinc-Based Solders/Alloys: Solder Zinc Alloy for Repair ASTM A780 Annex A1; Welco Gal-Viz self-fluxing solder alloy, Galvalloy, Galvabar or equal, ASTM A780, paragraph A1. Repair Using Zinc-Based Alloys.

D. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

E. 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 8,000 psi at 7 days; of consistency suitable for application and a 30 minute working time.

F. Safety Stair Nosings: At stairs and landings as indicated, aggregate integral warning stripe extruded aluminum, 2" inches wide Model H-225 by Balco Inc., Wichita Kansas, or Type WP 24A Wooster Products Inc., Wooster, OH. Provide 2" strip in contrasting color (70 percent contrasting) full width of step, 1" maximum from edge of nosing of each exterior tread and top landing (upper approach), and top and bottom steps of interior stairs unless nosings are indicated at all steps in drawings. Colors to be selected by Architect.

2.06 FABRICATION

2

A. Fit and shop assemble in largest practical sections for delivery to site.

B. Ease exposed edges to small uniform radius.

C. Fabricate items with joints tightly fitted and secured.

D. Welded Joints. Seal joined members by continuous welds. Dress welded joints, leaving no burrs, or sharp or abrasive corners, edges or surfaces.
1. Where exposed to view, dress welds in accordance with NOMMA Guidelines for Finish 1.
2. Where concealed, dress welds in accordance with NOMMA Guidelines for Finish 3.

E. Exposed Mechanically Fastened Joints. Make exposed, mechanically fastened joints hairline-tight, flush, butt joints. Secure with flush-mount, countersunk, screws or bolts; unobtrusively located; consistent with design of component, except where specifically indicated otherwise.

F. Provide components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as related metal fabrication, unless expressly indicated otherwise.

2.07 FINISHES

A. Steel and Iron
1. Clean surfaces of rust, scale, grease and foreign matter prior to finishing. Prepare in accordance with SSPC SP-2.
2. Galvanize steel items to zinc coating thickness in accordance with ASTM A123, minimum Coating Grade 80 (1.9 oz/sq. ft.). Surfaces shall be free of icicles, spangles and puddling. Provide venting holes at all enclosed sections, "V" notch, and drilled holes are acceptable. Locate to prevent rainwater from entering enclosed sections at exterior galvanized items. For sheet steel items, galvanize per ASTM A653 G60 Coating Designation.
3. Galvanized items to be painted: Do not use quenching solutions or treatments immediately after galvanizing. Refer to individual sections for galvanized items to be painted and to Section 09 90 00.
4. Do not prime surfaces in direct contact with concrete or where field welding is required.
5. For painted surfaces, prime items with two coats in accordance with requirements of primer specified herein.
6. Color Coated with Finish Special Coatings in accordance with Section 09 90 00 Painting for exposed surfaces.

B. Stainless Steel Finishes
1. Remove tool and die marks and stretch lines or blend into finish.
2. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
3. Bright, Directional Satin Finish No. 4.

C. Aluminum
1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Class I, Clear Anodic Finish AA-M12C22A41 (Mechanical Finish nonspecular as fabricated; Chemical Finish etched, medium matte; Anodic Coating Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

D. Apply two coats of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious materials or between dissimilar metals. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Do not begin installation until unsatisfactory conditions are corrected. Beginning installation means acceptance of existing conditions including the preparatory work of others, if any.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Allow for erection loads and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on shop drawings.
   1. Weld joints using shielded metal-arc welding (SMAW) method. Use coated welded rods, not fluxed, or type recommended by manufacturer for use with parent metal. Use only certified welders for structural construction.
   2. Grinding: Grind welds on surfaces subject to traffic or contact to smooth flush joints.
   3. Peening: Remove flux and weld spatter as necessary to eliminate unsightly conditions and grind off sharp projections.
   4. Permanently Concealed Welds: No treatment required other than preparation for painting or galvanizing.

D. Perform field welding in accordance with AWS standards and procedures for metal alloy welded.

E. Obtain Architect approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions and surfaces not shop primed except surfaces to be in contact with concrete.

G. Repair of Galvanized Surfaces: Ready mixed, zinc-rich galvanizing compound, ASTM A780 - A2. Repair Using Paints Containing Zinc Dust, minimum thickness 5 mils.

H. Repair of Galvanized Surfaces: ASTM A782 Annex A1, apply Gal-Viz while metal is still hot. Tin surface with Gal-Viz with wire brush. Do not direct flame on alloy. Minimum thickness, 5 mils.

I. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   1. Cast Aluminum: Heavy coat of alkali-resistant bituminous paint.
   2. Extruded Aluminum: Two coats of clear lacquer.

3.04 ERECTION TOLERANCE

A. Maximum Variation From Plumb 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment 1/4 inch.

3.05 FINISHES

A. Paint with Gloss Polyurethane High Performance Coatings in Special Coatings per Section 09 90 00 Painting.

3.06 SCHEDULE

A. Schedule is list of principal items only. Refer to Drawing details for items not specifically scheduled.

B. Fasteners: Provide fasteners and connectors of approved types, whether indicated or not.

C. Interior Vertical Access Ladder: minimum 16 inch ID wide tread surface on rungs.
   1. Side Rails: 3/8 inch by 2 inch steel bar.
   2. Rungs: 3/4-inch diameter solid steel rod spaced 12 inches on center vertically with knurled or skid-resistant surface.
   3. Mounting Brackets: 3/8-inch thick L-bent plate 8-1/2-inches by 3-inch legs, 4-inches deep, fabricated to provide 7 inches clearance from wall surface. Furnish steel wall backing plates, brackets, and anchors required for 48 inches, maximum on center spacing.
   4. Ladder safety post: Bilco LadderUP Safety Post Model LU-2, hot-dip galvanized steel or equal, telescoping tubular section with automatic lock when extended. Upward and downward movement controlled by stainless special alloy steel spring balancing mechanism. Secure to ladder rungs with manufacturer's fasteners.
   5. Ladder Safety Device Saf-T-Climb manufactured by North Safety Products or approved equal. Provide according to Code of Federal Regulations 29 CFR 1910.27 and ANSI A14.3.
   6. Cage for Ladder over 20 feet 1/4 by 2 inch hoops at 4 feet on centers, 7-3/16 by 1-1/2 inch vertical bars, solid riveted. Per Title 8, CCR, Construction Safety Orders.
   7. Elevator pit ladders shall have rungs spaced 7 inches from wall .
   8. Finish: paint per Section 09 90 00.

D. Miscellaneous Framing and Supports , Equipment Enclosures and as indicated on Drawings..
   1. Provide steel framing, or aluminum framing if indicated, and panels and supports as indicated in Drawings and as necessary to complete Work.
   2. Fabricate units from structural or hollow steel shapes, plates, structural supports, sheet metal and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   3. Hinges: Heavy-duty weld-on l type. Minimum 3 per leaf rated at 1000 lbs. each hinge.
   4. Enclosures and Gates As indicated on Drawings:
      a. Refer to Section 07 46 21, Equipment Screens.
   5. Refer to drawings for custom fabrication per details.

E. Railing and Handrails as detailed, refer to Section 05 52 00 for additional requirements.

END OF SECTION

SECTION 07 21 00

INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Thermal insulation in all exterior wall construction.

B. Sound attenuation insulation in all interior partition construction.

C. Related Requirements:
1. Energy calculations or prescriptive compliance documents.
2. Section 01 35 42, CALGreen Requirements.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM - American Society for Testing and Materials
1. ASTM C 165 - Test Method for Measuring Compressive Properties of Thermal Insulations
2. ASTM C 356 - Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat
3. ASTM C 612 - Mineral Fiber Block and Board Thermal Insulation
4. ASTM C 665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
5. ASTM C 1104 - Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation
6. ASTM C 1304 - Test Method for Assessing the Odor Emission of Thermal Insulation Materials
7. ASTM C 1338 - Test Method for Determining Fungi Resistance of Insulation Materials and Facings
8. ASTM D 816 - Rubber Cements
9. ASTM E 84 - Surface Burning Characteristics of Building Materials
10. ASTM E 96 - Test Methods for Water Vapor Transmission of Materials
11. ASTM E 136 - Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

C. CBC - 2019 California Building Code
1. CBC-7 - CBC Chapter 7, Fire and Smoke Protection Features.
2. Section 120, in conformance with ASTM E-84 or UL 723-Standard for Test for Surface Burning Characteristics of Building Materials.

D. 2019 California Energy Code, Title 24, Part 6, Subchapter 3, Section 140.3.

E. California Green Building Standards Code, CALGreen - 2019.

F. SCAQMD - South Coast Air Quality Management District Regulations Rule 1168 Adhesive and Sealant Applications.

1.03 PERFORMANCE REQUIREMENTS

A. Materials shall provide continuity of thermal barrier at building enclosure elements.

B. Materials shall provide continuity of sound barrier at designated room enclosure elements.

C. Materials shall conform to Section 720 Thermal and Sound Insulating Requirements, California Building Code and Section 110.8 California Energy Code.

D. Thermal Resistance: R values to achieve overall assembly U-Factor no greater than applicable value in Table 140.3-B California Energy Code unless noted otherwise in T-24 Energy Report.

1.04 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria and methods of installation.

B. Three samples of each material specified minimum 12 inches square. Provide fasteners, clips and other accessories.

C. Certification of Compliance with Section 110.8(a) California Energy Code, 2019 and Part 12, Title 24,CCR Standards for Insulating Materials Chapter 12-13, Section 12-13-1555.

D. CALGreen Submittals:
1. Product Data Sheets and Declaration Statements showing compliance with CALGreen Code per 1.05.B.

1.05 QUALITY ASSURANCE

A. Provide U-value limits in accordance with Section 140.3, Table 140.3-B of 2019 California Energy Code, Title 24 Part 6 California Code of Regulations.

B. California Green Building Standards Code, CALGreen - 2019.
1. Adhesives, sealants, primers, and caulks shall comply with air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, per CALGreen Tables 5.504.4.1 and 5.504.4.2.
2. Paints and Coatings shall comply with VOC limits in Table 1 of the ARB, per CALGreen Table 5.504.4.3.
3. Recycled Content: requirements per Section A5.405.4 CALGreen code.
4. Adhesives shall comply with VOC content limits defined by SCAQMD Rule 1168.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
   1. Johns Manville Insulations, Commercial/Industrial Division, Denver, CO.
   2. Certainteed Corporation, Valley Forge, PA.
   3. Owens - Corning, Toledo, OH.

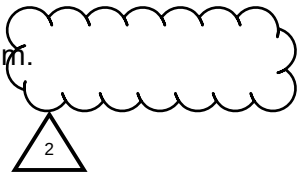
B. Or equal as approved in accordance with Division 01, General Requirements for Substitutions.

2.02 MATERIALS - THERMAL

A. Batt Insulation: ASTM C665, Type III, Class A, Category 1. Preformed, foil faced, formaldehyde-free glass fiber batt insulation, with tabs, Johns Manville FSK-25, or equal. Conforming to following:
   1. Thermal Resistance: R values to achieve overall assembly U-Factor no greater than applicable value in Table 140.3-B CEC unless noted otherwise in T-24 Energy Report.
   2. Batt Size: As required to fully fill cavity width and height or length.
   3. Thickness: As required to meet specified R-value without compression.
   4. Facing: Faced on one side with flame resistant foil facing.
   5. Flame Spread: Less than 25, ASTM E 84.
   6. Smoke Developed Rating: Maximum 50, ASTM E 84.
   7. Permeance: 0.05 perms, ASTM E 96.

2.03 MATERIALS - SOUND

A. Sound Attenuation Insulation: ASTM C665, Type I; preformed glass fiber, formaldehyde-free, "Sound Control Batts", acoustical fiber glass insulation, by Johns Manville or equal. Conforming to the following:
   1. Size: As required to fully fill cavity width and height.
   2. Thickness: 3-5/8" for 4" walls and 6-1/2" for 6" walls, minimum.
   3. Facing: Unfaced.
   4. Flame Spread: Less than 25, ASTM E84.
   5. Smoke Developed Rating: Maximum 50.
   6. Formaldehyde-free.



2.04 ACCESSORIES

A. Fasteners, type and size to suit application.

B. Tape: Acrylic with Polypropylene backing, Class A, flame spread less than 25, adhering type, 2-1/2 inch wide; No. 8087 Contractor's Seaming Tape, manufactured by 3m Company, St. Paul, MN, or equal as approved in accordance with Division 01, General Requirements for substitutions.

C. Insulation Fasteners: Steel impale spindle and clinch shield on flat metal base with applied adhesive, length to suit insulation thickness, capable of securely and rigidly fastening insulation in place; INSUL-ANCHORS, manufactured by Gemco, Dansville, OH, or equal as approved in accordance with Division 01, General Requirements for substitutions. Self-adhesive base plates are prohibited.

D. Adhesive: Tuff Bond Hanger Adhesive manufactured by Gemco, Dansville, OH, or equal as approved in accordance with Division 01, General Requirements for Substitutions.

E. String wire: Minimum 16 gauge galvanized annealed steel wire spaced at 18" on center.

F. Do not use salvage cut-offs, materials less than space width, or in multiple short lengths to fill-in the gaps.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify that substrate and adjacent materials are satisfactorily installed and in place and are ready to receive insulation.

3.02 INSTALLATION

A. Install insulation in accordance with insulation manufacturer's instructions.
   1. Clean tracks prior to installation.

B. Install in cavities designated to receive sound thermal insulation without gaps or voids. Extend material full height of cavity.

C. Cut insulation to fit tightly at cavities between studs not standard 16 inches on center spacing.

D. Trim insulation neatly to fit spaces.

E. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

F. Extend thermal materials full height of cavity to structure above and as otherwise required to produce a completely insulated building envelope.

G. Extend sound materials full height of cavity to structure above and as otherwise required to produce a completely sound insulated enclosure.

H. Tape and seal [butt ends, lapped flanges, and] tears or cuts in foil in thermal batts.

I. Friction fit semi-rigid sound insulation batts in cavities, no gaps voids permitted.

J. Metal Framing: Place foil side of thermal batts toward inside of building. Place insulation fasteners at 36 inches on centers, vertically in two rows at each stud cavity. Tape and seal tears or cuts in foil.

K. Install material to preclude slipping from place by use of nails, screws, wires or other approved fastening devices.

L. Where tight, congested, difficult or otherwise unforeseen conditions are encountered, employ alternate application methods or materials to effect the intended insulation system. Alternate methods or materials shall be submitted to Architect for review and approval..

3.03 INSPECTION

A. Notify Project Inspector before Work is covered. Approval by Project Inspector shall be received before any Work is concealed. Work that has been covered prior to inspection and approval shall be uncovered for inspection and recovered.

END OF SECTION

SECTION 07 26 16

VAPOR BARRIER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Installation of Vapor Barrier under concrete slabs.

B. Related Sections:
1. Section 03 30 00, Cast-In-Place Concrete.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. SCAQMD - South Coast Air Quality Management District - Rule 1113.

C. ASTM D 882 - Tensile Properties of Thin Plastic Sheeting.

D. ASTM D 1709 - Impact Resistance of Plastic Film by the Free-Falling Dart Method.

E. ASTM D 4833 - Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

F. ASTM E 96 - Water Vapor Transmission of Materials.

G. ASTM E 154 - Water Vapor Retarders Used in Contact with Earth under Concrete Slabs, on Walls, or as Ground Cover.

H. ASTM F 1249 - Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

I. ASTM E 1643 - Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

J. ASTM E 1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.03 SUBMITTALS

A. Product Data: For membrane materials and accessories.

B. Third party documentation that all testing was performed on a single production roll per ASTM E 1745 Section 8.1.

C. Manufacturer's Installation Instructions.

1.04 QUALITY ASSURANCE

A. Membrane Manufacturer: Company specializing in high strength density polyethylene use as vapor barrier with five years minimum experience.

B. Applicator: Company specializing in application of specified vapor barrier with three years minimum experience and approved by manufacturer.

C. Regulatory Requirements
1. Conform to AQMD, Local Regulation. Copies of document are available at Architect's office.

D. Field Sample
1. Approved sample may be incorporated as part of Work.

E. Manufacturer Review
1. Contact vapor barrier manufacturer for pre-construction meeting and/or to coordinate a review of the vapor barrier installation either by digital review or in person.
2. Contractor shall obtain written approval of installation of Vapor Barrier from manufacturer's representative prior to covering. Contractor shall submit copy of approval to the Architect and Commissioning Agent.

2

1.05 ENVIRONMENTAL REQUIREMENTS

A. Do not apply vapor barrier membrane when air temperature is below 50 degrees F.

1.06 WARRANTY

A. Provide manufacturer's limited 1 year warranty.

B. Warranty: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

C. Warranty: Include coverage of waterproofing failure to resist penetration of water except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered as structural failure.

D. Be responsible for removal and replacement of materials concealing waterproofing.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
1. Stego Industries LLC, San Juan Capistrano, CA; Product: 15 Mil Stego Wrap.
2. W.R. Meadows, Pomona, CA.; Product: Perminator 15 Mil
3. Reef Industries, Inc. Houston, TX. Product: Vaporguard.

B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.02 MATERIAL

A. Physical Properties:
1. Puncture Resistant Results, ASTM D1709: 2266 grams, min. Water Vapor
2. Transmission Rate, ASTM F 124: 0.0036 WVTR
3. Permeance (New Material), ASTM F 1249: 0.0086 perms
4. Permeance (After Conditioning Tests Per Section 7.1), ASTM E1745: Less than 0.010 perms.
5. Tensile Strength, ASTM E 1745: 70.6 pounds force per inch.
6. Performance Class, ASTM E 1745: Class A

2.03 ACCESSORIES

A. Seam Tape
1. Tape must have the following qualities:
a. Water Vapor Transmission Rate, ASTM E 96: 0.03 perms or lower
b. As approved by the vapor barrier manufacturer.

B. Proofing Mastic
1. Mastic must have the following qualities:
a. Water Vapor Transmission Rate, ASTM E 96: 0.17 perms or lower
b. As approved by the vapor barrier manufacturer.

C. Perimeter/Terminating Edge Seal (Choose one of the following)
1. Seal edge of vapor barrier to existing foundation wall or grade beam using double-sided adhesive strip with the following qualities:
a. Water Vapor Transmission Rate, ASTM E 96: 0.03 perms or lower
b. As approved by the vapor barrier manufacturer
2. Seal edge of vapor barrier to fresh concrete of slab using a tape with a textured surface that creates a mechanical seal to freshly-placed concrete with the following qualities:
a. Water Vapor Transmission Rate, ASTM E 96: 0.03 perms or lower
b. 180° Adhesion Peel Strength, ASTM D 903: 17.6 lbf/in
c. As approved by the vapor barrier manufacturer

D. Pipe Boots
1. Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer’s instructions.

PART 3 - EXECUTION

3.01 INSPECTION

A. For application under concrete slabs verify with Section 03 30 00 that substrate conditions are ready to receive membrane

B. Verify items that penetrate surfaces to receive waterproofing are securely installed and cleaned.

C. Beginning of installation means acceptance of substrate.

3.02 APPLICATION

A. Install vapor barrier over 4-inches of clean sand (sand equivelent or greater than 30).

B. Apply and seal vapor barrier under concrete slab in accordance with manufacturer's recommended procedures, ASTM E 1643 and per the following:
   1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement.
      a. Install vapor retarders in largest practical widths.
   2. Place sheets contnuous between footngs or foundaton walls, without voids.
   3. Lap vapor barrier over footings and/or seal to foundation walls.
   4. Lap all joints 6 inches minimum. Seal seams as noted below.
   5. Turn down sheeting 12 inches minimum along inside face of perimeter grade beams and/or contnuous perimeter footngs.
   6. Fit sheeting tightly around column, pipe and conduit penetrations. Install standard pipe boot where possible, following manufacturer's instructions.
   7. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utlities.
   8. Seam and Lap Sealing: With adhesive mastic and adhesive sealing tape, seal all seams, edges and penetrations of vapor retarder/barrier.
   9. For adhesive mastic seal, apply adhesive to both surfaces, allow approximately 10 minutes to set up and then press together smoothly and evenly, without gaps or fishmouths, for full contact bond.
   10. For adhesive tape seal, comply with manufacturer's instructions and recommendatons.
   11. Seal all penetratons with both adhesive sealing tape and adhesive mastc.
   12. Seal sheets to concrete footing faces and penetrating components with adhesive mastic or double sided tape as recommended by membrane manufacturer.
   13. Ensure there is no moisture entrapment by vapor retarder due to rainfall or ground water intrusion.
   14. Immediately repair holes in vapor retarder with self-adhesive repair tape.

C. For interior forming and screeding applications, do not use non-permanent stakes driven through the vapor barrier. Install forming and screeding devices per manufacturer’s standard.

3.03 PROTECTION

A. Close off area to prevent unauthorized traffic or work over membrane.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Wall Flashing.
2. Parapet Copings and Flashings.
3. Fascias and scuppers.
4. Roof flashings.
5. Reglets and counterflashing.
6. Roof joint cover flashings.
7. Downspouts and Strainers.
8. Conductor Heads.
9. Gravel Stops.
10. Counterflashings for roof hatches and skylights.
11. Interior Roof Drains.
12. Flashings for electrical conduits, mechanical lines and plumbing water lines roof [and wall] penetrations.
13. Door drips.
14. Equipment Roof Curbs and Flashing.
15. Equipment support stand penetrations.
16. Closures
17. Sill Pan Flashings.
18. Termination Bars.

B. Related Section:
1. Section 01 35 42, CALGreen Requirements.
2. Section 09 90 00, Painting.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. California Building Code 2019 Chapters 14 and 15.

C. California Green Building Standards Code, CALGreen - 2019.

D. American Society for Testing and Materials (ASTM)
1. ASTM A480/A480M- General Requirements for Flat-Rolled Stainless Steel and Heat Resisting Steel Plate, Sheet, and Strip.
2. ASTM A653/A653M-11 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc - Iron Alloy Coated by the Hot-Dip Process
3. ASTM B32 - Solder Metal
4. ASTM D4601 - Asphalt-Coated Glass Fiber Base Sheet Used in Roofing

E. National Roofing Contractors Association (NRCA)
   1. NRCA Manual - Fifth Edition.

F. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
   1. SMACNA Manual - Architectural Sheet Metal Manual, Current Edition

1.03 SUBMITTALS

A. Shop drawings showing material profile, jointing pattern, jointing details, fastening methods and installation details.

B. Product data.

C. CALGreen Submittals:
   1. Product Data Sheets and Declaration Statements showing compliance with CALGreen Code per 1.04.A.

D. Manufacturer's installation instructions.

E. Samples for each type of sheet metal flashing and trim indicated with field-applied color finishes.

1.04 QUALITY ASSURANCE

A. California Green Building Standards Code, CALGreen - 2019.
   1. Adhesives, sealants, primers and caulks shall comply with air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, per CALGreen Tables 5.504.4.1 and 5.504.4.2.
   2. Paints and Coatings shall comply with VOC limits in Table 1 of the ARB, per CALGreen Table 5.504.4.3.

1.05 STORAGE AND HANDLING

A. Stack preformed and pre-finished material to prevent twisting, bending, or abrasion and to provide ventilation.

B. Prevent contact with materials during storage that may cause discoloration, staining or damage.

PART 2 - PRODUCTS

2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M-11, G90.

2.02 ACCESSORIES

A. Fasteners: round head, galvanized steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as flashing metal.

B. Ice Dam Underlayment: 45 mil thick self-adhering high-temperature underlayment, R-Mer Seal by The Garland Company, or equal as approved in accordance with Division 01 for substitutions.

C. Metal Primer: For repair of Galvanized sheet metal, Zinc type, Galvilite by ZRC or equal.

D. Protective Backing Paint: Bituminous.

E. Sealant: Two-component, polyurethane-type specified in Section 07 92 00, Joint Sealants.

F. Solder: ASTM B32; Grade Sn50, flux type and alloy composition as required for use with metals to be soldered. Raw muriatic acid for galvanized steel.

G. Rosin-Sized sheathing paper: Sealtight Red Rosin Paper by W.R. Meadows.

H. Termination Bar: Mill finished Extruded aluminum (6063 alloy) with radius corners.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square and free from distortion or defects. Fabricate all components per SMACNA standards unless more stringent conditions are imposed by the Roofing Contractor, in that case the more stringent conditions shall prevail.

B. Fabricate cleats and starter strips of same material as sheet, interlockable with sheet.

C. Form pieces in longest practical lengths.

D. Hem exposed edges on underside 1/2 inch; miter and seam corners.

E. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

F. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

G. Solder lap seams of all non-moving metal joints and seal other metal joints, rivet to strengthen seam. After soldering, remove flux. Wipe and wash solder joints clean.

H. Fabricate corners from one piece with minimum 18 inch long legs; solder seam for rigidity.

I. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

J. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and break edges.

K. Provide expansion joints for gutters at every 30 feet. Fabricate per SMACNA details.

2.04 FINISH

A. Galvanized finish: ASTM A653/A653M-11, G90.

B. Shop prepare and prime exposed ferrous metal surfaces.

C. Back paint concealed metal surfaces with protective backing paint when in contact with copper, redwood or red cedar.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.

B. Verify membrane termination and base flashings are in place, sealed and secure.

C. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Field measure site conditions prior to fabricating Work.

B. Install starter and edge strips and cleats before starting installation.

C. Install reglets true to lines and levels. For surface-mounted seal top of reglets with sealant.

D. Insert counterflashings into reglets to form tight fit. Seal flashings into reglets with sealant.

E. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.

F. Lock and seal all joints.

G. Apply plastic-cement compound between metal flashings and felt flashings.

H. Install separate layer(s) of metal strips, counter flashings, and aluminum tapes prior to Ice Dam Underlayment installation where adjoining EPDM, TPO, or PVC membranes.

I. Fit flashings tight in place. Make corners square, surfaces true and straight in planes and lines accurate to profiles.

J. Seal metal joints watertight.

3.03 INSTALLATION

2

A. Field Quality Control: Commissioning agent shall provide Contractor a checklist prior to installation of materials and components specified below. Contractor shall verify installation and locations of all materials and components specified below using checklist. Submit copies to Architect and Commissioning Agent.

B. Wall Flashing: Flashing shall be installed in such a manner so as to prevent moisture from entering the wall or to redirect it to the exterior. Flashing shall be installed at the perimeters of exterior door and window assemblies, penetrations and terminations of exterior wall assemblies, exterior wall intersections with roofs, decks, balconies and similar projections and at built-in gutters and similar locations where moisture could enter the wall. Flashings with projecting flanges shall be installed on both sides and the ends of copings, under sills and continuously above projecting trim, Section 1405.3 CBC.
   1. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
   2. Openings Flashing in Frame Stud Construction: Install continuous head, sill, jamb, and similar opening flashings to extend 4 inches beyond wall openings. Install over self-adhesive flashings.
   3. Sealants for penetrations: specified in section 07 92 00 Joint Sealers.
   4. Submit shop drawings showing details for approval and use minimum of 24 gauge galvanized steel, UNO.

C. Parapet Copings and Flashings: Fabricate in minimum 96-inch long, but not exceeding 10-foot long sections. Use minimum 22-gauge galvanized steel. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg Provide all copings and caps of the types and shapes indicated on the Drawings. Install Self-Adhesive Flashing (Ice dam, high temperature) under copings. Build in integral expansion joints allowing for movement of the metal without resulting in distortion of coping or leaks of any kind. Miter corners, seal, and solder watertight. All Work shall be watertight.

D. Copings at top of wall:
   1. Copings: Manufactured coping system consisting of formed metal coping cap in section lengths not exceeding 12 feet, concealed anchorage, concealed splice plates with same finish as coping caps, mitered corner units, and end cap units.
      a. Manufacturers:
         1) R-Mer Edge Coping by The Garland Company.
         2) Or equal in accordance with Division 01, Substitutions
      b. Coping Caps: fabricated from the following exposed metal.
         1) Galvanized Steel: 22-Gauge.
      c. PVDF Finish, Coping Cap Color: As selected by Architect from manufacturer's full range.
      d. Corners: Continuously welded.
      e. Manufacturer's standard transitions, end caps, and attachments.

E. Fascias and Scuppers: Fabricate to detail of 20 gauge galvanized sheet. Apply sealant in all crevices. Fabricate scuppers with 6 inch flanges.

F. Roof Flashings: Provide roof flashings as indicated in drawings and required to complete entire project. Submit shop drawings showing details for approval, use minimum of 24 gauge galvanized steel.

G. Reglets and Counterflashings: Minimum 24 gauge galvanized steel as detailed in drawings, submit shop drawings.
   1. Reglets: For Surface-mounted and imbed applications.
   2. Counterflashings: Over bituminous base flashings.
   3. Counterflashings: Roof mounted mechanical equipment and vent stacks.
   4. Counterflashings: Roof Hatches and Skylights.

H. Roof Joint Cover Flashings: Provide roof joint covers as indicated in drawings. Submit shop drawings showing details for approval and use minimum of 24 gauge galvanized steel. Fabricate tops slope to drain.

I. Refrigerant Plumbing Lines Wall Flashing: Titan Outlet by Airex Manufacturing, Thousand Palms, CA or equal. Size as required to enclose pipes.

J. Downspouts and Strainers: Downspouts shall be 24 gauge, galvanized steel, rectangular unless noted otherwise. Strainers shall be 10 gauge galvanized steel wire basket type. Provide all anchor clips and straps as required for installation. Install a wire basket strainer in all downspouts at gutter level. Rivet and solder flange of downspout to gutters per SMACNA details. Locate downspouts every 30 feet unless otherwise noted on drawing. Provide splash pans. Concrete splash block, Section 03 48 00.
   1. At steel pipe overflow-drain and interior drain pipe leaders install Downspout Nozzle #1770 by JR Smith, Montgomery, Alabama. Nickel bronze with bird screen cast bronze body and flange. Refer to Drawings for pipe sizes and locations of drains and leaders. Minimum pipe size Schedule 40, 4 [6] inches, galvanized.
   2. Downspout Filter: FlowGard by KriStar Enterprises, Inc., Santa Rosa, CA. Model FG-DS4, 4" diameter, box size 14 x 29 x 7.5 inches, dual-wall geotextile fabric liner encapsulating absorbent, surfaced mounted unit. Locate at each pipe drain.

K. Conductor Heads: Provide conductor heads per SMACNA Figure 1-25, Design 1-25F unless Design Number noted otherwise; 24 gauge Galvanized sheet metal.

L. Gravel Stops: Fabricate of 24 gauge galvanized steel. Form true-to-line and detail as indicated. Provide formed corners locked and soldered full, with flashing flanges at least 4 inches under overlapping roofing materials and with aprons formed to straight lines. Install gravel stops in full bed of plastic cement and nail at 6 inch centers. All joints in gravel stops shall be butt type with back-up plates 12 inches long, of same gauge and profile as the gravel stop. Wipe all exposed surfaces clean. Protect adjacent, exposed surfaces from plastic cement smears and stains.

M. Counterflashings for roof hatches and skylights: 24 gauge sheet metal flashing, removable, per NRCA BUR/MB-14.

N. Roof Pipe Penetrations Flashings: Provide pre-manufactured flashings and counterflashings for pipe penetrations for electrical conduits, mechanical and plumbing lines. Flashing: galvanized steel., with 6" flange. Field seal top of cast-iron counterflashing with silicone sealant per Section 07 92 00, secure to pipe with set screw.
1. Model 1100-4 Series by Elmdor/Stoneman, City of Industry, CA: For single pipe penetrations and 1100-5 Series for vents.
2. Model 910 Future Flash and 915 Multi-Flash Adaptors by Elmdor/Stoneman, City of Industry, CA: Multiple-pipe penetrations, within single pre-manufactured flashing unit: Counterflashing: PVC cap, adapter base and compression nut. Compression rings and gasket. Install per manufacturer's instructions.

O. Window drips at heads of all doors and windows in exterior walls where no roof or overhead protection occurs :
1. At non-recessed or flush conditions: Provide drips of aluminum metal, extend drips 2-inches beyond jambs. Product: Superior Metal Trim SWD Superior Window Drip for 7/8" thick plaster, 2" leg, No. SWD 078-200A, or equal.
2. At recessed or soffit conditions: Provide drips of aluminum, alloy 6063 T5, clear anodized. Product: Fry Reglet Drip Screed, non-vented, No. DS-875-875 or equal.

P. Equipment Roof Curbs and Flashing: Fabricate equipment roof curbs with 20 gauge galvanized steel, not less than 8" high, with 6" flanges, full welded construction. Provide curb flashings and counterflashings, 24 gauge galvanized sheet metal fully soldered and mitered corners. Lengths, sizes, quantities, and location to completely flash roof equipment curbs. 2

Q. Roof Penetrations: Equipment support stand penetrations; 8" high Flashing Collar flanged 6", overlapped 4" by Rain Collar, 24 gauge components, secured with stainless steel drawband sealed top with polyurethane sealant. Stripping and roofing cement products per Roofing Section. Pitch pockets not permitted.

R. Miscellaneous: Provide miscellaneous flashings as indicated in drawings and required to complete entire project, except for items provided under other Sections. Submit shop drawings showing details for approval and use minimum of 24 gauge galvanized steel.
1. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

S. Galvanized sheet metal plaster reveals: 24 gauge sheet metal reveal moldings as detailed and as specified herein. Form molding flanges with screed to slope and drain moisture away from plaster. 2

T. Sill Pans and Window Flashings: Window, door and storefront sill/jamb pans per SMACNA, ASTM E2112 or manufacturer's recommendations. Sill pans: Fabricate from 24 galvanized sheet metal fully soldered seams , minimum 4" high returns at window openings, 1/2" turnup at back.

3.04 FINISH

A. Paint exposed metal flashings with High Performance paints in accordance with Section 09 90 00, for Special Coatings. Colors to be selected by Architect.
   1. Parapet Coping to match metal panel color where adjacent.
   2. Parapet Coping to match curtain wall color (clear anodized) where adjacent.
   3. Parapet Coping to match plaster color where adjacent.

END OF SECTION

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Expansion joint cover assemblies for roofs, walls, ceilings and floor surfaces.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM - American Society for Testing and Materials
   1. ASTM E119 - Methods for Fire Tests of Building Construction and Materials.
   2. ASTM E1399 - Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.

C. ADA - Americans with Disabilities Act of 1990, as amended.
   1. ADA Standards - ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

D. 2019 California Referenced Standard Code (CCR Title 24, Part 12), Chapter 12-7-1 Fire Resistive Standards.

1.03 SUBMITTALS

A. Product Data: Provide joint assembly profiles, dimensions, locations in Work, affected adjacent construction, anchorage devices, available colors and finish and locations of splices.

B. Shop Drawings: Provide the following for each joint system specified:
   1. Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, blockout requirement, entire route of each joint system, and attachments to other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
   2. Detailing of anchorage devices.

C. Three samples illustrating profile, dimension, color and finish and flexible seal selected.

D. Manufacturer's Installation Instructions, Indicate rough-in sizes. Provide templates for cast-in or placed frames or anchors and indicate tolerances for item placement.

E. UL or California State Fire Marshal approval numbers on assemblies submitted.

F. Certification that products meet ASTM E119 fire classification tests and ASTM E1399 joint movement capability.

1.04 FIELD MEASUREMENTS

A. Verify that field measurements are as instructed by manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
1. C/S Group, Conspec Systems, Muncy, PA.
2. MM System Corp., Pendergrass, GA.
3. Watson-Bowman-Acme Corp., Amherst, NY.
4. JointMaster/InPro Corporation, Muskego, WI.
5. Thermal Structures Inc., Corona, CA.
6. Balco Inc.
7. Emseal Joint Systems, Westborough, MA.

B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.02 MATERIALS

A. Refer to drawings for type of assemblies required in specific locations.

B. Types:
1. Series ASM-200, aluminum exterior wall joint covers, extruded aluminum with "Duroflex" gasket (polyethylene vapor barrier).
2. Emseal Seismic Colorseal expansion joint. Colors as selected by Architect.
3. Refer to drawings for widths.

2.03 FABRICATION

A. Back paint components in contact with cementitious materials.

B. Galvanize embedded ferrous metal anchors and fastening devices.

C. Shop assemble components and package with anchors and fittings.

D. Provide joint components in single length wherever practical. Minimize site splicing.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify that joint preparation and affected dimensions are acceptable.

3.02 PREPARATION

A. Provide anchoring devices for installation and embedment.

B. Provide templates and rough-in measurements.

3.03 FABRICATION

A. Furnish units in longest practicable lengths.

B. Provide hairline joints, miter corners.

C. Provide closure materials, transition pieces, T-joints, corner, curbs, cross-connections and accessories required to provide continuous joint cover assemblies. Provide a silicone bead at all transitions in addition to items listed above to provide a water tight connection between all joints.

3.04 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor components to substrate to prevent misalignment. 2

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following tests on areas as selected by Architect.
   1. Water-Spray Test (Field Check): Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
      a. Perform tests on 5% (rounded up to nearest whole number) of expansion joint assemblies in areas as directed by Architect.
      b. Perform tests in each test area as directed by Architect. Perform tests, prior to 50, and 90 percent completion.

C. Expansion joint assemblies will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.06 PROTECTION OF FINISHED WORK

A. Do not permit traffic over unprotected floor joint surfaces.

B. Provide removable strippable coating or reinforced cloth tape protect finish surface.

END OF SECTION

SECTION 08 12 13

HOLLOW METAL FRAMES - WELDED

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Non-rated and Fire-rated Welded steel frames for doors ,transoms , and borrowed lights.

B. Related Sections
1. Section 06 20 00, Finish Carpentry - Installation of Doors.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. SDI - Steel Door Institute.
1. SDI 100 - Recommended Specifications for Standard Steel Doors and Frames, Latest Edition.
2. SDI 111 - Recommended Standard Details Steel Doors and Frames.
3. SDI 117 - Manufacturing Tolerances Standard Steel Doors and Frames.
4. SDI 118 - Basic Fire Door Requirements.
5. SDI 134 - Glossary of Terms for Hollow Metal Doors and Frames.

C. ANSI - American National Standards Institute
1. ANSI A250.4 and A450.5 - Test Procedure / Acceptance Criteria for Physical Conformance.
2. ANSI A250.6- Hardware on Steel Doors (Reinforcement Applications).
3. ANSI A250.8/SDI-100 - Recommended Specifications for Standard Steel Doors and Frames, Latest Edition.
4. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Steel Surfaces for Steel Doors and Frames.
5. ANSI A250.11/SDI-105 - Recommended Erection Instructions for Steel Frames.

D. ASTM - American Society for Testing and Materials
1. ASTM A653 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc - Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A924 – General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
3. ASTM A1008 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
4. ASTM D6386 – Preparation of Hot-Dipped Galvanized Coated Iron and Steel and Hardware Surfaces for Painting.

E. ADA - Americans with Disabilities Act of 1990, as amended.

1. ADA Standards – ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

F. CBC - 2019 California Building Code.

G. CRSC - California Referenced Standards Code (CCR Title 24, Part 12)
1. CRSC-7A.2 - Standard 12-7A-2, Exterior Windows
2. CRSC-7A.4 - Standard 12-7A-4 Fire Resistive Standards, Fire Door Assemble Tests
3. CRSC-10.2 - Standard 12-10-2 Single Point Latching or Locking Devices
4. CRSC-10.3 - Standard 12-10-3 Emergency Exit and Panic Hardware

H. NFPA - National Fire Protection Association
1. NFPA 80 - Fire Doors and Windows

I. UL - Underwriters Laboratories, Inc.
1. UL-10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Fire Tests of Door Assemblies

J. Standard 12-7-4 Fire Resistive Standards, Fire Door Test Assembly Tests - California Referenced Standards Code, CCR Title 24, Part 12.

K. AWS - American Welding Society
1. AWS A2.4 - Standard Symbols for Welding, Brazing and Non Destructive Examination
2. AWS A5.1 - Carbon Steel Electrodes for Shielded Metal Arc-Welding
3. AWS A5.5 - Low Alloy Steel Electrodes for Shielded Metal Arc-Welding
4. AWS B2.1 - Welding Procedure and Performance Qualification
5. AWS D1.1 - Structural Welding Code, Steel
6. AWS D1.3 - Structural Welding Code, Sheet Steel

1.03 SUBMITTALS

A. Shop drawings indicating frame configuration, anchor types and spacing, location of cutouts for hardware, reinforcement and finish.

B. Product data.

C. Manufacturer's installation instructions.

D. Job Closeout: provide one complete manufacturer's catalog to Owner's lock shop or Authorized Representative.

1.04 QUALITY ASSURANCE

A. Manufacture frames to conform to SDI standards except where exceeded by this Specification.

B. Comply with ANSI/SDI A250.4 Level A, one million cycle swing test performance for 3070 door frames.

C. Manufacturer: Company specializing in manufacturing products specified in this Section having minimum five (5) years experience.

D. Installer: Firm with minimum five (5) years experience in installation of metal doors and frames.

1.05 DELIVERY, STORAGE AND PROTECTION

A. Deliver and protect frames with manufacturer's shipping safeguards.

B. Attach spreader bars on welded frames to preclude warping or bending during delivery and storage.

C. Storage: Store in dry secure location. Place units on minimum 4 inch high wood blocking. Avoid non-vented plastic or canvas shelters. Provide 1/4 inch wide spaces between stacked units.

1.06 WARRANTY

A. One-year warranty against defects in materials and workmanship. Warranty to commence at Date of Certified Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
1. Ceco Door, Milan, TN.
2. Curries Company, Mason City, IA.
3. Door Components, Inc., Fontana, CA.
4. Mesker Doors, Huntsville, AL.
5. Republic Doors and Frames, McKenzie, TN.
6. SteelCraft, an Allegion Brand, Dublin, Ireland.

B. Or equal in accordance with Division 01, General Requirements for Substitutions.

2.02 WELDED FRAMES 2

A. Type: ANSI A250.8/SDI-100 - Interior frames shall be Level 1, Standard Duty frames, minimum 18-gauge and exterior frames shall be Level 2, Heavy Duty frames, minimum 16-gauge, with integral stop and flat trim, double rabbet, profiles as indicated on Drawings, cold rolled steel, Commercial Steel, ASTM A1008, paintable galvannealed steel ASTM A653 and ASTM A924 for exterior applications.

B. Anchors: Provide two anchors at head for openings up to 48 inches, three if wider, maximum 30 inches on centers. Provide three at jamb for doors up to 84 inches in height, additional anchors at maximum 30 inches on centers for higher doors.
1. Provide appropriate type of anchors consistent with type of wall construction for each installation and in conformance with SDI 111 and ANSI 250.11.

C. Floor Attachment: Provide adjustable base anchor with extension for expansion anchor attachment to concrete floor. Extension factory welded. Minimum thickness: 14 gauge.
   1. Wedge Type: KWIK Bolt TZ, 3/8 to 3/4 inch diameter, ICC ESR-1917, by Hilti Inc., Tulsa, OK.
   2. Monolithic Concrete Slabs: Clip-type anchors, with holes to receive fasteners.

D. Hardware Attachment: Mortise, reinforce, drill and tap at factory to receive specified hardware. Install minimum 10 gauge reinforcing welded to frame for surface mounted hardware, except install 7 gauge reinforcing for hinges. Tap to templates.
   1. Install reinforcing for closers, both sides of frames, on all frames, single and pairs, labeled and non-labeled.
   2. Use 10 Gauge reinforcing for locks, panics, closers, and hold-open arms.

E. Silencers: Make provision for minimum three rubber silencers at strike jamb of all doors except fire-rated doors, and one at head of each leaf of double doors, except fire-rated doors.

F. Fire-Rated Frames:
   1. Construct as tested and rated in accordance with SDI 118.
   2. Conform to Standard 12-7-4 Fire Resistive Standards, Fire Door Test Assembly Tests - California Referenced Standards Code, CCR Title 24, Part 12 and NFPA 80.
   3. Attach UL or WH label to frame.
   4. Solid grout frames abutting against masonry and concrete walls.
   5. Refer to drawings for rating requirements.

2.03 PROTECTIVE COATINGS

2

A. Interior Frames:
   1. Metallic coating protection not required.
   2. Pretreat and shop prime, air-dried, conforming to ANSI A250.10.
   3. Finish paint frames under Section 09 90 00 Painting, colors per Finish Schedule on Drawings.

B. Exterior Frames:
   1. Metallic coating protection required: ASTM A653, hot-dipped galvanized, zinc-coated iron alloy A60 paintable galvannealed coating.
   2. Pretreat and shop prime, air-dried, conforming to ANSI A250.10.
   3. Finish paint frames under Section 09 90 00, colors per Finish Schedule on Drawings.
   4. Wipe coat galvanized steel is not permitted.

C. On surfaces where metallic coating has been damaged or removed during fabrication, frames shall be touched-up with factory-applied primer.

2.04 FABRICATION

A. Fabricate exterior welded steel door frames machine-mitered and full welded (Continuously Welded) unit type. Weld and grind smooth. No intermittent welds or plate splices permitted at intersections.

B. Fabricate interior welded steel door, borrowed lights , and transom frames as machine-mitered face-welded unit type. Weld and grind smooth.
   1. Where cross mullions or T intersections occur, frames shall be fabricated as butted and face-welded assembly joints. At mullion-to-base intersections extend mullion to floor and face weld. Where butted joints are exposed to weather, seal intersection as specified in Section 07 92 00.

C. At borrowed lights , transom frames apply minimum 5/8-inch-high, 16 gauge channel stops. Attach with flat head machine screws, countersunk, tamper-proof type on outside of exterior frames.
   1. Channel stops to be located on outside of exterior frames and on secure side of interior frames.

D. Machine mitered faces and butt-joined integral stops permitted with continuous welds.

E. Fabricate frames with hardware reinforcement plates welded in place.

F. Fabricate frames to accept anchors as described in SDI-111 for type of wall construction.

G. Reinforce frames for door closers on both sides of frames.

H. Apply primer to all surfaces of frames, in accordance with requirements of ANSI A250.10. Metallic-coated protected surfaces shall be pretreated prior to application of primer.

I. Attach fire-rated label to each fire-rated door frame.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install frames in accordance with ANSI A250.11/SDI-105.
   1. Installation of jamb anchors to steel framing: Per SDI-105.
   2. Install Floor anchors, 1 clip angle per jamb with expansion wedge type anchor.
   3. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

B. Fire doors frames shall be installed in accordance with their listing, Standard 12-7-4 Fire Resistive Standards, Fire Door Assembly Tests California Referenced Standards Code, CCR Title 24, Part 12, and NFPA No. 80, and the manufacturer's instructions.

C. Install insulation behind frames, unless noted otherwise.

D. Coordinate anchor placement with type of wall construction.

E. Paint frames under Section 09 90 00, Painting.

3.02 TOLERANCES

A. Conform to standard of tolerances as required in SDI-117.

END OF SECTION

SECTION 08 13 13

HOLLOW METAL DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fire-rated rolled-steel doors.

B. Related Sections:
1. Section 06 20 00, Finish Carpentry - Installation of Doors.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ADA - Americans with Disabilities Act of 1990, as amended.
1. ADA Standards - ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

C. SDI - Steel Door Institute.
1. SDI 100 - Recommended Specifications for Standard Steel Doors and Frames, Latest Edition.
2. SDI 118 - Basic Fire Door Requirements.
3. SDI 111 - Standard Details Steel Doors and Frames .
4. SDI 117 - Manufacturing Tolerances Standard Steel Doors and Frames.

D. ANSI - American National Standards Institute
1. ANSI A250.4 - Test Procedures and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
2. ANSI A250.5 - Accelerated Physical Endurance Test Procedure for Steel Doors, Frames, and Frame Anchors.
3. ANSI A250.8/SDI 100 - Recommended Specifications for Standard Steel Doors and Frames.
4. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI A250.11/105 - Recommended Erection Instructions for Steel Frames.

E. ASTM - American Society for Testing and Materials
1. ASTM A653 - Standard Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
3. ASTM A1008 - Standard Specifications for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

4. ASTM A568 - General Requirements for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.

F. CBC - 2019 California Building Code
1. CBC-10 - CBC Chapter 10, Means of Egress
2. CBC-11 - CBC Chapter 11B, Accessibility to Public Buildings, Public Accommodations, Commercial Facilities and Publicly Funded Housing

G. CRSC - California Referenced Standards Code (CCR Title 24, Part 12)
1. CRSC-7A.4 - Standard 12-7-4 Fire Resistive Standards, Fire Door Assemble Tests
2. CRSC-10.2 - Standard 12-10-2 Single Point Latching or Locking Devices
3. CRSC-10.3 - Standard 12-10-3 Emergency Exit and Panic Hardware

H. NFPA - National Fire Protection Association
1. NFPA 80 - Fire Doors and Windows
2. NFPA 105 - Installation of Smoke Door Assemblies
3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies

I. UL - Underwriters Laboratories, Inc.
1. UL 10C - Positive Pressure Fire Tests of Door Assemblies
2. UL 1784 - Air Leakage Test for Door Assemblies

J. ITS-WH - Intertek Testing Services-Warnock-Hersey.

1.03 SUBMITTALS

A. Shop drawings indicating core material, location of cutouts for hardware, reinforcement and finish.

B. Product data.

C. Manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

A. Manufacture doors to conform to SDI standards except where exceeded by this Specification.

B. Comply with ANSI/SDI A250.4 Test Procedure and Acceptance Criteria for - Physical Endurance for Steel Doors and Hardware Reinforcings. Level A, one million cycle swing test performance.

C. ADA-The Americans with Disabilities Act - Title II-Uniform Federal Accessibility Standards.

1.05 DELIVERY, STORAGE AND PROTECTION

A. Deliver and protect doors with manufacturer's shipping safeguards.

B. Storage: Store in dry secure location. Place units on minimum 4-inch high wood blocking. Avoid non-vented plastic or canvas shelters. Provide 1/4-inch wide spaces between stacked doors.

1.06 WARRANTY

A. One-year warranty against defects in materials and workmanship. Warranty to commence at Date of Certified Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form the basis for design and quality intended.
1. Ceco Door, Milan, TN.
2. Curries Company, Mason City, IA.
3. Door Components, Inc., Fontana, CA.
4. Mesker Doors, Huntsville, AL.
5. Republic Doors and Frames, McKenzie, TN.
6. SteelCraft, an Allegion Brand, Dublin, Ireland.

B. Or equal in accordance with Division 01, General Requirements for Substitutions.

2.02 DOORS

A. Exterior Doors: ANSI A250.8/SDI-100, Level 3, Extra Heavy-Duty and Physical Performance Level A, 1-3/4-inches thick, Model 2 Seamless, 16-gauge cold-rolled face sheets, ASTM A653, seamless, continuously welded seam dressed smooth, hollow-steel construction, sizes as scheduled on drawings. Close top and bottom with flush end closures, seal and make top closures watertight. Beveled edge profile.

B. Interior Doors: ANSI A250.8/SDI-100, Level 2, Heavy-Duty, Physical Performance Level B, 1-3/4-inches thick, Model 2 Seamless, 18-gauge cold-rolled face sheets, ASTM A1008, seamless continuously welded seam dressed smooth, hollow-steel construction, Close top and bottom with flush end closure, beveled edge profile, sizes as scheduled on drawings, prime coated only.

C. End Closures: Minimum 18 gauge.

D. Fire Rated Doors Assembly: Test in accordance with NFPA 252. CRSC California Referenced Standards Code, Standard 12-7-4, Fire Door Assembly Tests.

E. Fire Rated Doors: Label "S" for smoke assembly requirements, NFPA 80, NFPA 105.

2.03 DOOR CORE

2

A. Performance Test Procedures Requirements: Conform to ANSI A250.4

B. Core for Fire-Rated Doors: mineral core 16-20 lb. density (incombustible). Conform to Door Schedule for fire rating required.

C. Frames for Fire-Rated Doors: Conform to CRSC California Referenced Standards Code, Standard 12-7-4, fire door tests, Label "S" for smoke assembly requirements NFPA 105 and Section 08 12 13.

2.04 PROTECTIVE COATINGS

A. Interior Doors:
1. Metallic-coating protection not required.
2. Pre-treat and shop prime with modified alkyd, air-dried, conforming to ANSI A250.10.

B. Exterior Doors:
1. Metallic coating protection required, types permitted: ASTM A653, hot-dip galvanized, zinc-iron alloy A60 paintable galvannealed coating.
2. Pre-treat and shop prime with modified alkyd, air-dried, conforming to ANSI A250.10.
3. Finish paint doors under Section 09 90 00, Painting, colors per Finish Schedule on Drawings.

2

C. On surfaces where zinc has been damaged or removed during fabrication, doors shall be touched-up with factory-applied primer.

2.05 FABRICATION

A. Fabricate doors from cold-rolled steel conforming to ASTM A1008/A1008M or ASTM A924. Stretcher-leveled standard of flatness for face sheets.

B. Manufacturing tolerances per SDI 117 - Manufacturing Tolerances Standard Steel Doors and Frames.

C. Fabricate doors with cutouts sized for hardware and openings as indicated. Non-handed doors using hinge fillers are not permitted.

D. Reinforce, drill and tap doors to receive mortise hinges, locks, latches, flush bolts and closer. Use reinforcing gauges as listed in Table 4 of ANSI A250.8/SDI-100. Channel or plate reinforcing only.

E. Locate hardware according to Table 5, ANSI A250.8/SDI-100, CBC 11B-404.2.7.

F. Apply primer to all surfaces of doors in accordance with requirements of ANSI A250.10. Metallic-coated surfaces shall be pre-treated prior to application of primer.

G. Attach fire-rated label to hinge-stile of each fire-rated door unit and frames.

H. Hardware Enclosures: Provide enclosures and junction boxes within doors for electrically operated door hardware, interconnected with UL-approved, 1/2-inch-diameter conduit and connectors. Where indicated for installation of wiring, provide access plates to junction boxes, fabricated from same material and thickness as face sheet and fastened with at least 4 security fasteners spaced not more than 6 inches on centers.

PART 3 - EXECUTION

3.01 INSTALLATION OF HOLLOW METAL DOORS

A. Install doors in accordance with SDI ANSI A250.11/105 and SDI 122 recommendations.

B. Install doors under Section 06 20 00 Finish Carpentry - Installation of Doors.

C. Coordinate installation of glass or louvers where indicated.

3.02 ADJUSTING AND CLEANING

A. Adjust for smooth and balanced door movement.

B. Paint doors under Section 09 90 00, colors per Finish Schedule on Drawings.

END OF SECTION

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wood doors, fire-rated and non-rated.

B. Glass stops.

C. Related Sections:
1. Section 01 35 42, CALGreen Requirements.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ANSI A208.1 - American National Standard -Particleboard.

C. WDMA I.S.1A - (Latest Edition) - Window and Door Manufacturers Association.

D. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.

E. Chapter 7 and 10, 2019 California Building Code.

F. ADA - Americans with Disabilities Act of 1990, as amended.
1. ADA Standards ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

G. WI - Manual of Millwork, Architectural Woodwork Standards (AWS), Latest Edition.

H. CBC - 2019 California Building Code
1. CBC-10 - CBC Chapter 10, Means of Egress
2. CBC-11 - CBC Chapter 11B, Accessibility to Public Buildings, Public Accommodations, Commercial Facilities and Publicly Funded Housing

I. California Green Building Standards Code, CALGreen - 2019.

J. CRSC - California Referenced Standards Code (CCR Title 24, Part 12)
1. CRSC-7A.4 - Standard 12-7A-4 Fire Resistive Standards, Fire Door Assemble Tests
2. CRSC-10.2 - Standard 12-10-2 Single Point Latching or Locking Devices
3. CRSC-10.3 - Standard 12-10-3 Emergency Exit and Panic Hardware

K. NFPA - National Fire Protection Association
1. NFPA 80 - Fire Doors and Windows

2. NFPA 105 - Installation of Smoke Door Assemblies
3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies

L. UL - Underwriters Laboratories, Inc.
1. UL-10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Fire Tests of Door Assemblies

M. WH - Warnock-Hersey Laboratory

N. ITS-WH - Intertek Testing Services-Warnock-Hersey.

1.03 SUBMITTALS

A. Shop drawings indicating door elevations, types, hand, thickness, stile and rail reinforcement, internal blocking for hardware attachment and cutouts.

B. Product data.

C. CALGreen Submittals:
1. Product Data Sheets and Declaration Statements showing compliance with CALGreen Code per 1.04.I.

D. Three samples for transparent finish doors provide two 36 x 36 inches samples, of each door type specified, illustrating each face veneer specified. Samples shall illustrate core material and finish choice.

E. Manufacturer's installation instructions.

F. Certificate of Compliance for fire-rated doors.

1.04 QUALITY ASSURANCE

A. Conform to Standard 12-7-4 Fire Resistive Standards, Fire Door Assemble Tests - California Referenced Standards Code, CCR Title 24, Part 12 and NFPA 80.

B. Provide doors from one manufacturer only.

C. Doors shall be manufactured in accordance with Section 12 of the Latest edition of the Architectural Woodwork Standards (AWS) of the Woodwork Institute for Premium Grade, Hot Press 5-Ply construction, bonded construction, or to higher standards as specified herein.

D. Before delivery to jobsite, door supplier shall submit WI Certified Compliance Certificate, countersigned by manufacturer, indicating products he will furnish for this job and certifying that they will fully meet requirements of grade or grades specified.

E. First page of shop drawings shall bear WI Certified Compliance Label. Shop drawings not conforming to this requirement will be rejected.

F. One (1) copy of latest issue of WI Architectural Woodworks Standards (AWS) shall be made available for reference at jobsite throughout installation period.

G. Upon completion, WI Certified Compliance Certificate, countersigned by manufacturer, shall be submitted.

H. California Green Building Standards Code, CALGreen - 2019.
   1. Adhesives, sealants, primers, and caulks shall comply with air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, per CALGreen Tables 5.504.4.1 and 5.504.4.2.
   2. Paints and Coatings shall comply with VOC limits in Table 1 of the ARB, per CALGreen Table 5.504.4.3
   3. Composite wood products (plywood, particle board, medium density fiberboard) shall comply with Formaldehyde limits per CALGreen Table 5.504.4.5.

1.05 DELIVERY, STORAGE AND PROTECTION

A. Protect doors with resilient packaging, sealed with heat shrunk plastic or other manufacturer's shipping safeguards.

B. Package, deliver and store doors in accordance with WI requirements.
   1. Store in dry, broom-clean area.
   2. Protect materials from damage.
   3. Replace units damaged, warped or otherwise not usable.

C. Exposed wood at tops, bottoms and cutouts for hardware and accessories: Seal prior to shipment.

1.06 WARRANTY

A. Provide documentation under provisions of Division 01, General Requirements.

B. Provide Life-of-Original-Installation Warranty for solid core interior doors.
   1. Warranty shall state that doors will not warp, twist, bend, shrink, the veneers buckle or delaminate, or the joints open for the warranty period. Any door of 25 square feet or larger may have a warp or twist of not more than 1/4 inch in eight feet. Any door that develops defects within the scope of the warranty shall be replaced with a new door without expense to the Owner.
   2. During the first year of warranty, replacement doors shall be delivered to the Contractor for installation.
   3. During the succeeding years of the warranty, replacement doors shall be delivered to the building in which defective door is located. Bill of lading shall indicate the name of the building and room or location where door is to be replaced. Warranty shall include cost of removal of defective unit, installation of replacement and finishing.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
   1. Marshfield Door Systems Inc., Marshfield, WI.
   2. Eggers Industries, Two Rivers, WI.
   3. VTI Industries, Holstein, IA.
   4. Algoma Architectural Doors, Algoma, WI.
   5. Oshkosh Door Company, Oshkosh, WI.
   6. Haley Bros., Inc., Buena Park, CA.
   7. Graham Wood Doors, Mason City, IA.
   8. ABS Manufacturing, Stockton, CA.
   9. Western Oregon Door, Winston, OR.

B. Or equal as approved in accordance with Division 01, General Requirements for Substitutions.

2.02 DOOR CONSTRUCTION TYPES

A. Particle Board Core PC-5 (Non-Fire-Rated)
   1. Thickness: 1-3/4 inch.
   2. Face:
      a. Transparent Finish:
         1) Grade: Premium, Grade "AA" faces .
         2) Face: wood veneer, species; Select Select White Maple hardwood veneer, sapwood.
         3) Cut: plain sliced.
         4) Matching: balance slip match for leaf matching.
         5) Pair Match: Balance Match for doors in pairs.
         6) Set Match: Balance Match for doors in sets.
   3. Crossband: Hardwood veneer or engineered high-density fiberboard, 1/16 inch thick.
   4. Stiles: Stiles same species at transparent finish.
   5. Top and Bottom rails: 1-1/8 inch hardwood or softwood mill option, bonded to core.
   6. Face Assembly Adhesive: Type I, waterproof.
   7. Core Assembly Adhesive: Type II, water-resistant.
   8. Core: Particleboard, 28 lb. low density, ANSI A208.1, Table A, Grade LD-2.
   9. Moisture Stripping: Sealed edges.
   10. Acoustical rating: 31 STC
   11. Blocking for Hardware: Flame resistant, 6 inch top edge for closers, 5.5 inches for bottom hardware or automatic closers where applicable, 5 x 18 inch lock blocks, 5.5 inch cross blocking for panic hardware, 5 x 12 inch for floor closers or pivot hinges where applicable.
   12. Performance Rating: Extra Heavy Duty.

B. Particle Board Core - PC-5 20PP (20 minute fire rated, Positive Pressure), S-Label, smoke and draft rated.
   1. Thickness: 1-3/4 inch.

2. Face:
   a. Transparent Finish:
      1) Grade: Premium, Grade "AA" faces .
      2) Face: wood veneer, species; Select Select White Maple hardwood veneer, sapwood.
      3) Cut: plain sliced.
      4) Matching: balance slip match for leaf matching.
      5) Pair Match: Balance Match for doors in pairs.
      6) Set Match: Balance Match for doors in sets.
3. Crossband: Hardwood veneer or engineered high density fiberboard, 1/16 inch thick.
4. Stiles: Stiles same species at transparent finish. Factory install concealed intumescent seals per UL 10C, Category A.
5. Top and Bottom Rails: 1-1/8 inch hardwood or softwood mill option, bonded to core. Install intumescent seals per UL 10C at top rail.
6. Face Assembly Adhesive: Type I, waterproof.
7. Core Assembly Adhesive: Type II, water-resistant.
8. Core: Particleboard, 28 lb. low density, ANSI A208.1, Table A Grade LD-2
9. Moisture Stripping: Not applicable.
10. Acoustical rating: 29 STC
11. Blocking for Hardware: Flame resistant, 6 inch top edge for closers, 5.5 inches for bottom hardware or automatic closers where applicable, 5 x 18 inch for lock blocks, 5.5 inches cross blocking for panic hardware, 5 x 12 inch for floor closers or pivot hinges where applicable.
12. Performance Rating: Extra Heavy Duty.

C. Pair of doors in exits: Minimum width of doors, 32 inches, to allow a clear unobstructed opening of 32 inches in width when door is positioned at an angle of 90 degrees from its closed position.

2.03 ACCESSORIES

A. Glass Stop: Unit frame, Model FGS 75 manufactured by Anemostat Products Division, Carson, CA, or equal as approved in accordance with Division 01, General Requirements for Substitutions, for fire-rated and non-fire-rated doors.
   1. Frame: 18 gauge.
   2. Finish: Beige baked enamel primer, paint per Section 09 90 00, color as selected by Architect.
   3. Glass: Refer to Section 08 80 00.
   4. Mounting: Countersink, one-way vandal resistant heads, through bolts.

B. Ratings: For doors specified.

2

2.04 FABRICATION

A. Fabricate non-rated doors in accordance with WI Quality Standards and WDMA I.S.1-A.

B. Fabricate fire-rated doors in accordance with WI Quality Standards and WDMA I.S.1-A-Latest Edition and to UL or WH requirements. Attach permanent metal fire-rating label to door edge, either on hinge stile or top edge.

C. Intumescent Seals: Fabricate fire-rated doors with intumescent seals in accordance with UL 10C, Category A, for positive pressure compliance. Furnish flush with door edge type intumescent seals, exposed at top rail and veneer-covered at stiles. Frame Surface-applied adhesive seals, Category B, not permitted.

D. Pre-machine doors at factory for finish hardware. Cutouts for hardware in doors having a fire rating of 20 minutes or more shall be accomplished at the factory before labels are affixed. Preparation shall be performed in accordance with manufacturer's inspection service procedure and under label service.

E. Medium density overlay shall be readily sandable. Hardboard surface material not permitted.

F. Only five-ply hot-press construction is permitted.

G. Veneer: Face veneer grain shall run vertically; crossband veneer run horizontally.

H. Transom Panels: Same construction as doors. For transparent finish: continuous match.

2.05 FACTORY FINISH

A. Factory Finish: Premium finish, meet or exceed performance standards of WI System 4 Conversion Varnish, clear and opaque. Factory-finished doors shall be installed just prior to Substantial Completion.
   1. Stained and sealed finish: Refer to Finish Schedule on Drawings and as selected by Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Section 06 20 00.

3.02 INSTALLATION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge corner to corner, or as required to meet door warranty.

B. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08 41 13

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aluminum doors, frames, glazing components and glazed lights.

B. Shadow Boxes.

C. Anchors, brackets and attachments.

D. Door hardware.

E. Perimeter sealant.

F. Partition Closures.

G. Related Sections:
1. Section 08 71 00, Door Hardware.
2. Section 08 71 05, Acoustical Door Gaskets.
3. Section 08 80 00, Glazing.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM - American Society for Testing and Materials
1. ASTM A36 - Structural Steel.
2. ASTM A123 - Zinc (Hot-Dip Galvanized) coatings on Iron and Steel Products.
3. ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape and Tube.
4. ASTM E90 - Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
5. ASTM E283 - Rate of Air Leakage through External Windows, Curtain Walls and Doors.
6. ASTM E330 - Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
7. ASTM E331 - Water Penetration of Exterior Windows, Curtain Walls and Doors.
8. ASTM E1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation.
9. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
10. ASTM E1425 - Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylights, and Glazed Wall Systems.

C. AAMA - American Architectural Manufactures Association: AAMA 501 - Methods of Test for Exterior Walls. (Mfg's mock up tested in lab).

D. Test per AAMA 503-12 Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.

E. AAMA TIR-A11-04 - Maximum Allowable deflection of Framing Systems for Building Cladding Components at Design Wind Loads.

F. AAMA 1801 - Voluntary Specification for the Acoustical Rating of Exterior Windows, Doors, Skylights, and Glazed Window Sections.

G. ADA - Americans with Disabilities Act of 1990, as amended.
   1. ADA Standards - ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

H. CBC - 2019 California Building Code.

I. DSA - The Division of the State Architect.

J. ICC - International Code Council.

K. CPSC 16 CFR 1201- U.S. Consumer Products Safety Commission, Safety Standard for Architectural Glazing Material, Consumer Protection Safety Commission, Code of Federal Regulations. All glazing shall be tested in accordance with CPSC 16 CFR 1201. Glazing shall comply with the test criteria for Category II as indicated in Table 2406.2(1), 2019 CBC.

1.03 SYSTEM DESCRIPTION

A. Performance Requirements
   1. System to provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F without causing detrimental effects to system or components.
   2. Design and size members to withstand dead loads and live loads caused by pressure and suction of wind as calculated in accordance with requirements of Chapter 24, and Chapter 16A Section 1609A of CBC and ASCE 7 Chapter 6.
   3. Uniform Load: A static air design load of 20 psf shall be applied in the positive and negative direction in accordance with ASTM E330. No deflection in excess of L/175 of the span of any framing member up to 13'-6" and L/240 13'-6" plus 1/4" and above. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
   4. Limit water infiltration to zero at 12 pounds-force per square foot, ASTM E331.
   5. Air Infiltration: ASTM E283; maximum .06 cfm per square foot of fixed area when tested at 6.24 pounds per square foot (50 wind speed) static air pressure difference

6. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.
7. When a pair of doors is used, one of the doors to provide clear, unobstructed opening 32 inches in width with the door positioned at an angle 90 degrees from its closed position.
8. Noise Reduction: Test according to ASTM E90, with ratings determined by ASTM E1332.:

1.04 SUBMITTALS

A. Shop Drawings: including system and component dimensions; components with in assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.

B. Product data

C. Manufacturer's installation instructions.

D. Samples: Three samples, illustrating pre-finished aluminum surface and specified glass.

E. Deferred Approval
1. Installation of Aluminum Storefronts and Entrances shall not be started until detailed plans and specifications are approved by Division of the State Architect, (DSA).
2. DSA Approval: Manufacturer shall furnish Architect complete shop drawings and calculations as specified above, certified and stamped by Structural Engineer currently licensed in California. Manufacturer shall employ and pay Engineer for Certification of Drawings and Calculations.
    a. Architect will submit drawings and calculations to DSA for approval before fabrication.
    b. Show details of Aluminum Storefront fasteners and anchorage to structural members at head and jambs. Size of anchors and embedment lengths, use 80 percent of ICC Reports capacities for anchors. Key details to elevation section.
    c. Headers and king studs connections to structural beams and columns. Provide details keyed to elevations section.
    d. Provide calculations for worst case D+L+Seismic or wind loads, justify connections. Consider areas of discontinuity as required by CBC.
    e. Calculations required: analyze and design jamb and head elements (king studs, header beams).
    f. The aluminum mullions and cross pieces shall be designed by a Registered Engineer (with calculations) show sectional properties. Show connections between storefront and various elements.
3. Refer to Division 01, General Requirements for Deferred Approvals.

1.05 DELIVERY, STORAGE AND HANDLING

A. Provide wrapping or strippable coating to protect pre-finished aluminum surfaces.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to product manufacturer.
   2. Manufacturer Qualifications: Manufacturer capable of providing structural calculations, applicable independent product test reports, installation instructions, a review of the application method, customer approval and periodic field service representation during construction.
   3. On access control installations, all wiring to be coordinated with a licensed electrical installer.

B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.07 MOCKUPS

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical wall area as shown on Drawings.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.09 WARRANTY

A. Provide under Provisions of Division 01 General Requirements.

B. Warranty: Include coverage for complete System installation for failure to meet specified requirements.
   1. Failures include, but are not limited to the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Air and Water leakage through fixed glazing and framing areas.
      d. Failure of operating components to function properly.

C. Special Finish Warranty: Contractor agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: 10 years

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
   1. Arcadia Inc., Vernon, CA.
   2. Kawneer Company, Inc., Visalia, CA.
   3. EFCO Corporation, Monett, MO.
   4. Oldcastle Glass/Vistawall Architectural Products, Terrell, TX.
   5. Wausau Window and Wall Systems, Wausau, WI.
   6. Graham Architectural Products

B. Or equal as approved in accordance with Division 01 General Requirements for Substitutions.

2.02 MATERIALS

A. Extruded Aluminum: ASTM B221; 6063-T6 alloy and temper.

B. Glazing Gaskets:
   1. EPDM elastomeric extrusions

C. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, non-migrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements

D. Steel Reinforcement Sections: ASTM, A36; shapes to suit mullion sections, ASTM A611 for cold-rolled sheets.

E. Touch-Up Primer for Galvanized Surfaces: Zinc-rich Type.

F. Fasteners: Stainless steel.

G. Sealant: per Section 07 92 00 Joint Sealers.

2.03 FABRICATED COMPONENTS

A. Frames: 2-1/4" x 6", profile with offset glazed. Minimum wall thickness of 0.08 inches. Framing Section Properties in confirmance with Wind Load and height requirements.
   1. Model:
      a. SF1: Arcadia TC670 Series: Thermally broken, captured, offset glazed, 1" glazing, 2-1/4" x 6".
      b. Screw Spline System.
      c. Or equal in accordance with Division 01, General Requirements

B. Entrances - Swing doors:
   1. Arcadia WS 512 HD, Heavy Duty
      a. Wide stile, size 2 inches x 5 inches, 5-1/8 inch top rail, offset pivot hinges. 10 inch bottom rail. Square glass stops. Thermally Broken.
      b. For 1" insulating glazing.
      c. Acoustical door gaskets as indicated in Schedule on Drawings.

C. Shadow Boxes: Comply requirements with Section 08 80 00.

D. Partition Closures - Aluminum: Sound Barrier Mullion Trip Cap Systems by Mull-it-Over or approved equal.
   1. Profile: 55 Classic Mullion Trim Cap
   2. Components:
      a. Aluminum Extrusions:
      b. Thickness: 0.125 inches.
      c. Profile: As selected and approved by Architect to allow solid attachment and fastening to the partition wall framing.
   3. Sound Absorbing Foam:
      a. Resistant to smoke, flame, and microbial growth.
      b. Fire Rating: ASTM E 84 Class 1.
      c. Fungi Resistance: Zero rating per ASTM G 21.
   4. Compressible Foam: Between edge of extrusion and interior face of curtain wall glass.
      a. Thickness: Standard 1/2 inch (12.7 mm), 3/4" (19.1 mm), 1 inch (25.4 mm) or 1-1/2" (38.1 mm) as required to accommodate mullion deflection.
      b. Color: Light gray
   5. Fasteners:
      a. Self Tapping or appropriate threaded fastener.
      b. Compatible with all materials fasteners will contact with and not causing galvanic corrosion.
   6. Snap Cover: Snap-on fastener cover.
   7. Acoustical Sound Sealant: Acrylic latex based.
   8. Accessories:
      a. Provide necessary and related parts and tools to complete installation.
   9. Finish: As selected by Architect.

E. Corner Mullions: 90 degree inside and outside corners, refer to drawings.

2.04 GLASS AND GLAZING MATERIALS

A. Tempered glass: All glazing shall be tested in accordance with CPSC 16 CFR 1201, and comply with the test criteria for Category II as indicated in Table 2406.2(1), 2019 CBC.

B. Glass in Exterior Lights and Doors: 1" thick insulating, tempered, tinted Low-E glass for TRIFAB VG 451T Thermal , as specified in Section 08 80 00.

C. Glazing: All units shall be "dry" glazed with EPDM gasket on both exterior and interior.

2.05 HARDWARE - DOORS

A. Applied Stop with weathering: Manufacturer's standard.

B. Sill Sweep Strips: Resilient seal type, Manufacturer's standard.

C. Threshold: Extruded aluminum, one piece per door opening 4 inches wide, 1/2 inch high, Manufacturer's standard.

D. Hinges: Refer to Section 08 71 00, Door Hardware.

E. Cross Rail: 3-1/2 inch high, Manufacturer's standard.

F. Pull Bars (non-panic locations): As specified in Section 08 71 00.

G. Panic Devices: As specified in Section 08 71 00.

H. Closer: As specified in Section 08 71 00.

I. Cylinder Lock: As specified in Section 08 71 00.

J. Weatherstripping:
   1. Meeting stiles on pairs of doors: adjustable astragal utilizing wool pile with polymeric fin.
   2. Single acting door and frame: thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.

K. Provide EPDM or vinyl-blade gasket weather-stripping in bottom of door rail, adjustable for contact with threshold.

2.06 FABRICATION

A. Fabricate doors and frames allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation. Door corner construction shall consist of mechanical clip fastening, Shielded Inert Gas Metal Arc deep penetration plug welds and 1-1/8" long fillet welds inside and outside of all four corners.

B. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline and weatherproof.

C. Develop drainage holes with moisture pattern to exterior.

D. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

E. Prepare components to receive anchor devices. Fabricate anchorage items.

F. Arrange fasteners, attachments and jointing to ensure concealment from view.

G. Prepare components with internal reinforcement for door hardware and door operator hinge hardware.

H. Provide acoustic door gasket where indicated.

2.07 FINISHES

A. Extruded Aluminum Surfaces: Clear Anodized AA-M10C22A41, Class I, 0.7 mil, AAMA 611.

B. Apply two coats of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

2.08 SOURCE QUALITY CONTROL

A. Source Quality: Provide aluminum entrances specified herein from a single source.

B. Fabrication Tolerances: Fabricate aluminum entrances in accordance with entrance manufacturer’s prescribed tolerances.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify wall openings and adjoining air and vapor seal materials are ready to receive Work of this Section.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install doors, frames, glazing and hardware in accordance with manufacturer's instructions. .
   1. Install doors and hardware in accordance with manufacturer’s printed instructions.
   2. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weather-tight construction.

B. Use anchorage devices to securely attach frame assembly to structure.

C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work.

D. Coordinate attachment and seal of air and vapor barrier materials.

E. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

F. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.

G. Install glass and infill panels in accordance with Section 08 80 00, using exterior manufacturer's standard extruded glazing gaskets.

H. Install perimeter two component polyurethane type sealant, backing materials, and installation requirements in accordance with Section 07 92 00. Color shall match adjacent aluminum finish.

I. Adjust operating hardware.

J. Install Partition Closures at voids between glazing system and abutting walls, per manufacturer's recommendations.

3.03 TOLERANCES

A. Variation from Plane: 0.03 inches per foot maximum or 0.25 inches per 30 feet, whichever is less.

B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following tests on representative areas of aluminum-framed entrances and storefronts.
   1. Test per AAMA 503-12 and ASTM E1105 Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems. During construction prior to issuance of the building occupancy permit, but no later than six months after issuance of the occupancy permit.
      a. Air Infiltration Tests: Conduct tests in accordance with AAMA 503 and ASTM E783. Allowable air infiltration (air leakage) shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft2, whichever is greater.
      b. Water Infiltration Tests: Conduct tests in accordance with AAMA 503 and ASTM E1105. No uncontrolled water leakage is permitted when tested at a static pressure of two-thirds the specified water penetration pressure but not less than 6.2 psf (300 Pa).
   2. Water-Spray Test (Field Check): Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
      a. Perform tests on 5% (rounded up to nearest whole number) of aluminum-framed entrances and storefronts in areas as directed by Architect.
      b. Perform tests in each test area as directed by Architect. Perform tests, prior to 50, and 90 percent completion.

2

C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and/or inspections.

D. Prepare test and inspection reports.

3.05 ADJUSTING

A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.06 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08 62 70

TUBULAR DAYLIGHTING DEVICE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Tubular daylighting device system and accessories; configuration as indicated on the drawings.

1.02 RELATED SECTIONS

A. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings.

B. Division 26 - Electrical, Equipment Wiring, Electrical connections.

1.03 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008a.

D. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2006.

E. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2007.

F. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.

G. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.

H. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.

I. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.

J. ASTM E 1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

K. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricane.

L. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position; 2006.

M. ASTM D-1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).

N. UL 181 - Factory Made Air Ducts and Air Connectors

O. ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2008.

1.04 PERFORMANCE REQUIREMENTS

A. Completed tubular daylighting device assemblies shall be capable of meeting the following performance requirements:
   1. SOLAMASTER 750 DS-C (CLOSED CEILING)
      a. AAMA/WDMA/CSA 101/IS2/A440, Class CW-PG70, size tested 21 inch (530 mm) diameter, Type TDDOC and Type TDDCC.
         1) Air Infiltration Test:
            a) Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
         2) Water Resistance Test:
            a) Passes water resistance; no uncontrolled water leakage with a pressure differential of 10.7 psf (512 Pa) or 15 percent of the design load (whichever is greater) and a water spray rate of 5 gallons/hour/sf for 24 minutes when tested in accordance with ASTM E 547 and ASTM E 331.
         3) Uniform Load Test: All units tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
            a) No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 70 psf (3.35 kPa).
      b. Fire Testing:
         1) Fire Rated Roof Assemblies:
            a) When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the California Building Code for Class A, B, and C roof assemblies.
         2) When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the California Building Code.

3) Self-Ignition Temperature - Greater than 650 degrees F per ASTM D-1929.
4) Smoke Density: Rating no greater than 450 per ASTM E 84 in way intended for use. Classification C.
5) Rate of Burn and/or Extent: Maximum Burning Rate: 2.5 inches/min (62 mm/min) Classification CC-2 per ASTM D 635.
6) Rate of Burn and/or Extent: Maximum Burn Extent: 1 inch (25 mm) Classification CC-1 per ASTM D 635.

c. Fall Protection Performance:
1) Passes fall protection test: No penetration of dome or curb cap when subject to 400 lb (160 Kg)/42 inch (1066 mm) impact drop test when tested in accordance with OSHA 29 CFR 1926.506(c) Safety Net Systems.
2) Passes fall protection test: California State OSHA Fall Protection Code of Regulations, Title 8, Section 3212 (e)(1) Skylight Screens.

1.05 SUBMITTALS

A. 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.

B. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.

C. Verification Samples: As requested by Architect.

D. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engaged in manufacture of tubular daylighting devices for minimum 20 years.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 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.

1.09 WARRANTY

A. Daylighting Device: Manufacturer's standard warranty for 10 years.

B. Electrical Parts: Manufacturer’s standard warranty for 5 years, unless otherwise indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Solatube International, Inc., Vista, CA. Web: www.solatube.com

B. Or equal in accordance with Division 01 for substitutions.

2.02 TUBULAR DAYLIGHTING DEVICES

A. Tubular Daylighting Devices General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC AC-16.

B. SolaMaster Series: Solatube Model 750 DS, 21 inch (530 mm) Daylighting System:
   1. Model:
      a. Solatube Model 750 DS-C Closed (Penetrating) Ceiling. AAMA Type TDDCC.
   2. Capture Zone:
      a. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
         1) Outer Dome Glazing: Type DA, 0.125 inch (3.2 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV A), impact modified acrylic blend.
            a) Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
      b. Tube Ring: 0.090 inch (2.3 mm) nominal thickness injection molded high impact PVC. Prevents thermal bridging between base flashing and tubing and channel condensed moisture. Attached to base of dome ring with butyl glazing rope 0.24 inch (6 mm) diameter; to minimize air infiltration.
      c. Dome Seal: Adhesive backed weatherstrip, 0.63 inch (16 mm) tall by 0.28 inch (7 mm) wide.
   3. Flashings:
      a. Roof Flashing Base:
         1) One Piece: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube. Sheet steel, corrosion resistant conforming to ASTM A 653/A 653M or ASTM A 463/A 463M or ASTM A792/A 792M, 0.028 inch (0.7 mm) plus or minus .006 inch (.015 mm) thick.

a) Base Style: Type FC, Curb cap, with inside dimensions of 27 inches by 27 inches (685 mm by 685 mm) to cover curb as specified in Section 07 60 00.

b. Curbs: Metal Insulated Roof Curb: Corrosion resistant 18 Gauge hot-dipped galvanized steel conforming to ASTM A 653 G90 with continuous welded seams, integrated base plate for water tightness and extra strength, lined with 1-1/2 inch fiberglass fireproof sound attenuating thermal insulation, factory installed 2 by 2 treated wood nailer secured to top ledge of curb. Curb designed for single-ply roofing, lightweight fill or tapered insulation low slope roof types.
   1) C12 12 inch (305 mm) high Metal insulated curb
   2) Curbs provided by manufacturer.

c. Flashing Options:
   1) Curb Cap Insulation: Type CCI, Nominal 1 inch thick thermal insulation pad to reduce thermal conduction between curb-cap and tubing and thermal convection between room air and curb-cap. Rated R-6 (OFxft2xhr/Btu) Insulation is Polyisocyanurate foam utilizing CFC, HCFC, & HFC free blowing agent. Type-1 Class-1 per ASTM C 1289; Passes UL 1715 (15-minute thermal barrier per IBC 2603.4); Attic ventilation may be required per IBC 1203.2(OFxft2xhr/Btu). For use with Flashing Type FC.

4. Transfer Zone:
   a. Extension Tubes: Aluminum sheet, thickness 0.018 inch (0.5 mm) conforming to ASTM B 209.
      1) Reflective Tubes:
         a) Reflective extension tube, Type EXX and Type EL with total length of run as indicated on the Drawings.
         b) Interior Finish: Spectralight Infinity with INFRAREDuction Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance.
      2) Tube Options
         a) Extension Tube Angle Adapter: Provide manufacturer's standard adapters for applications requiring:
         b) Type A1 one 0 to 90 degree extension tube angle adapter.
         c) Type A2 two 0 to 90 degree extension tube angle adapters.
         d) Top Tube Angle Adapter and Bottom Tube Angle Adapter Kit: Type AK, Reflective 45 degree adjustable top and bottom angle adapters (one each), 16 inches (406 mm) long

5. Delivery Zone:
   a. Diffuser Assemblies for Tubes Penetrating Ceilings: Solatube Model 750 DS-C. Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube; 23.8 inches by 23.8 inches (605 mm by 605 mm) square frame to fit standard suspended ceiling grids or hard ceilings.
      1) Metal Transition Box: Type TM, Metal Round to Square transition box comprised of Spectralight Infinity SoftLight material with structured finish on exposed reflective surface, .015 in (0.4 mm) thick. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.

b. Lens: Type L1, OptiView Fresnel lens design to maximize light output and diffusion with extruded aluminum frame and EPDM foam seal to minimize condensation and bug, dirt and air infiltration per ASTM E 283. Visible Light Transmission shall be greater than 90 percent at 0.022 inch (0.6 mm) thick. Classified as CC2.

c. Delivery Zone Options:

1) Daylight Dimmer - 0 to 10 V Dimmer Control: Provide an electrical actuator controller, auxiliary switch(s), and cable as specified in Section 25 50 00; Common Work Results Electrical Section 26 05 00; and Lighting Equipment and Controls Section 26 50 00.

a) Low Voltage Daylight Dimmer: Type D1, is an Electro-mechanically actuated daylight valve; 0-10 V Control, Class-2, UL Listed. Low voltage Daylight Dimmer electrical actuator provides for programmable (0 to 10VDC) scene-based dimming control for daylight output between 2 and 100 percent, auxiliary 12VDC dimming control for daylight output between 2 and 100 percent, or auxiliary ON/OFF control. Input voltage: 24VAC at 50 or 60 Hz.

b) Programmable (0 to 10VDC) Control: requires an electrical actuator controller or building automation controller capable of producing a signal between 0 and +10 VDC (Min 50mA) to incrementally modulate up to 50 daisy chained Daylight Dimmers (Current Sinking) between fully closed at 0 to 1 volts to fully open at 9 to 10 volts.

c) Auxiliary 12VDC Dimming Control: requires 12VDC Dimming Switch (Current Sourcing; 12VDC power supply not required).

d) Requires CL-2 (Min), 18AWG, stranded copper, two conductor, twisted cable from lighting controller to first dimmer and interconnecting between subsequent dimmers

e) Auxiliary ON/OFF Control: requires commercial or residential single pole electric light switch.

f) ON/OFF control requires CL-2 (Min), 22 AWG, stranded, three conductor, twisted cable from switch to first dimmer and CL-2 (Min), 18 AWG, stranded copper, two conductor twisted cable; interconnecting subsequent dimmers.

d. Power can be transformed from line voltage through use of a UL Listed Class-2, 24VAC Transformer.

6. Accessories

a. Optional Low-voltage Transformer: Solatube Remote Transformer, Type TR20, is a 20VA, 24VAC, 50/60HZ, UL Listed, UL Category XOKV7, CE Marked, Class-2 Transformer with cover plate mounting system configured for easy field assembly onto standard 4.06 inch by 4.06 inch (103 mm by 103 mm) square junction box: Inherently Limited, Primary: 120VAC, 208VAC, 240VAC, and 277VAC. For use with Daylight Dimmer Type D1 only.

7. Catalog Number: S750DS-C-FC-CCI-AK-EXX-A1-A2-TM -L1-D1-TR20-C12

2.03 ACCESSORIES

A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.

B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.

C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 - EXECUTION

3.01 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.

3.02 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.

C. Coordinate requirements for power supply, conduit and wiring.

3.03 INSTALLATION

A. Install in accordance with manufacturer's printed instructions.

B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

2

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. After completion of installation and nominal curing of sealant and glazing compounds, but before installation of interior finishes, test for water leaks according to AAMA 501.2.

C. Perform test on 5% (rounded to the nearest whole number) of tubular daylighting systems.

D. Work will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.05 PROTECTION

2

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08 63 00

TRANSLUCENT ROOF ASSEMBLY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Insulated translucent roof panel assemblies.

B. Flashed and weather sealed.

C. Related Sections:
1. Section 05 12 00, Structural Steel.
2. Section 07 62 00, Sheet Metal Flashing and Trim.
3. Section 07 92 00, Joint Sealants.
4. Section 08 80 00, Glazing.

1.02 WORK INCLUDED:

A. Design, engineer, manufacture and installation of two panels insulated translucent skylights panel system. An assembly of two independent insulated single glazing polycarbonate panels in one integrated daylighting panel assembly, incorporated into a complete aluminum framed system that has been tested and warranted by the manufacturer as a single source system. The exterior single panel can be removed at any time, independently of the interior single panel and without exposing the building's interior. The interior single insulated panel remains intact for the life of the building envelope.

B. All anchors, brackets, and hardware attachments necessary to complete the specified structural assembly, weatherability and water-tightness performance requirements. All flashing up to but not penetrating adjoining work are also required as part of the system and shall be included.

C. Trained and factory authorized labor with supervision to complete the entire panel installation.

1.03 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bar, Rod, Wire, Shape and Tube.

C. ASTM D2244 - Calculation of Color Differences from Instrumentally Measured Color Coordinates.

D. UL 723 (ASTM E84) - Surface Burning Characteristics of Building Materials.

E. ASTM E283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.

F. ASTM E331 - Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

G. Chapter 24 and 26, California Building Code, 2019.

1.04 QUALITY ASSURANCE

A. The glazing panels must be evaluated and listed by recognized building code evaluation organization: International Council Evaluation Service Inc (ICC-ES)

B. Materials and Products shall be manufactured by a company continuously and regularly employed in the manufacturing, engineering, and designing, stocking and building of skylights using the specified material and system for a period of at least ten (10) years. Manufacturers shall provide a list of at least ten (10) projects having been in place a minimum of ten (10) years, with similar size, scope, climate and type.

C. Erection shall be by a factory-approved installer who has been in the business of erecting similar material for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.

D. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system, in accordance with the requirements of this specification.

1.05 SUBMITTALS

A. Submit shop drawings and color samples in accordance with Division 01.

B. Manufacturer shall submit written guarantee accompanied by substantiating data, stating that the products to be furnished are in accordance with or exceed these specifications.

C. The manufacturer shall submit certified test reports made by an independent organization. Reports shall verify that the material will meet all performance requirements of this specification. Previously completed test reports will be acceptable if they are indicative of products used on this project. Test reports required are:
   1. Self Ignition Temperature (ASTM 1929-3)
   2. Smoke Density (ASTM D-2843)
   3. Burning Extent (ASTM D-635)
   4. Interior Flame Spread (ASTM E-84)

5. Class A roof construction per ASTM E108, FM 4470, NFPA 256, UBC 32-7, ULC-S107, UL 790
6. Color Difference (ASTM D-2244-85)
7. Weathering Evaluation before and after exposure to 300°F, 25 minutes include Light Transmission and Color Change, per ASTM E-1175, and ASTM D-2244 respectively.
8. OSHA Life Safety Fall and Walk Through Protection for 300 lb. point load per STD 29 CFR 1910.23 (e)(8)
9. OSHA Life Safety STD 29 CFR - Impact loading by blunt object of 500 ft. lbs. per ASTM E-695-03
10. CalOSHA 600 lb load - California Code or Regulations, Title 8, Section 1623(b)(3) & Section 3212(b)
11. Insulation's 'U' value - Center of Glazing per NFRC100.
12. Insulation's 'U' value for skylight system, glazing and aluminum framing, per NFRC 100 & NFRC 700 certification.
13. Visible light Transmission (VT) per ASTM E972 & ASTM E1084
14. Solar Heat Gain Coefficient (SHGC) based on tests or calculations which are based on tests per methodology and procedure given in the NFRC/Calorimeter Standard.
15. Maximum air infiltration rate for fenestration assemblies, per NFRC 400 or ASTM E283.
16. Water Penetration (ASTM E-331)
17. Load Bearing Capability (ASTM E-330-97)
18. Performance of exterior windows, curtain walls when impacted by wind-borne debris per ASTM E 1996-02, Level D
19. Haze per ASTM D 1003 for glare measurement.
20. ICC evaluation service report.

1.06 MAINTENANCE DATA

A. The manufacturer shall provide recommended maintenance procedures, schedule of maintenance and materials required or recommended for maintenance.

B. Submit Installer Certificate signed by installer, certifying compliance with project qualification requirements.

1.07 WARRANTY:

A. Provide a single source skylight system manufacturer warranty against defective materials and fabrication. Submit manufacturer's written warranty agreeing to repair skylight system work, which fails in materials within one year from date of delivery.

B. Provide single source skylight's manufacturer 10 year glazing panel warranty. Third party warranty for glazing panels shall not be acceptable. Glazing warranty to include:
   1. Change in light transmission of no more than 6% per ASTM D-1003

2. No delamination of panel affecting appearance, performance or structural integrity of the panel or the system
3. Thermal aging - the light transmission and the color shall not change after exposure to heat of 300°F for 25 minutes (when measured per ASTM D-1003 and ASTM D-2244 respectively).

C. In addition submit installer's written warranty agreeing to repair installation workmanship, defects and leaks within one year from date of delivery.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. The design and performance criteria of this job are based on the Quadwall - 2 panel skylight systems as manufactured by CPI Daylighting, Inc.
   1. The system noted herein and the products have been submitted to DSA and the DSA approval is specific to these products indicated herein. If the contractor request a substitution of any of these products, systems or related items indicated he shall be responsible for the following:
      a. Approved equal shall meet or exceed performance items specified herein as a basis of design.
      b. Contractor shall secure DSA approval with assistance of the architect. All time spent with the architect in securing this approval shall be reimbursed by the Contractor at office billing rates.
      c. Any time spent by the Architect in coordinating the material substitution, reviewing items, trips to DSA, DSA communications, securing approvals and related items shall be reimbursed as aforementioned.

B. APPROVED MANUFACTURERS
   1. Other manufacturers may bid this project provided they comply with all requirements of the specification and submit evidence of compliance with all performance criteria specified herein. This evidence must include proof of conformance and test reports as per Article 1.05. Any exceptions taken from this specification must be noted on the approval request. If no exceptions are noted and approval is given, product performance will be as specified. Should non-compliance be subsequently discovered, the previously given approval will be invalidated and use of the product on the project will be disallowed. All manufacturers acceptable for use on this project under this section must be approved prior to bid. Requests for approval, with all appropriate submittal data and samples must be received no less than 10 days prior to bid date. A list of all approved manufacturers and products will be issued by addendum. No other manufacturers will be acceptable. No verbal approval will be given. Listing manufacturers' names in this specification does not constitute approval of their products or relieve them of compliance with all the performance requirements contained herein. Fiberglass skins are unacceptable**.** Single panel system in lieu of 2 panel system is unacceptable.

2.02 TRANSLUCENT PANEL PERFORMANCE AND APPEARANCE

A. Panel construction for Longevity and Resistant to Buckling and Pressure:
   1. Translucent panels must be constructed of tight cell sizes not exceeding 0.18". Wide cell l size exceeding 0.18"shall not be acceptable.
   2. The translucent panel shall include an integral extruded tight-cell structural core. The panel's exterior skins shall be connected with supporting continuous ribs, perpendicular to the skins, at a spacing not to exceed 0.18" (truss-like construction). In addition, the space between the two exterior skins shall be divided by multiple parallel horizontal surfaces, at a spacing not to exceed 0.18".

B. Translucent Skylight Panel - Two Panel Assembly:
   1. Design, engineer, manufacture and installation of two panel insulated translucent skylight system. An assembly of TWO independent insulated single panels of extruded polycarbonate into one glazing assembly, incorporated into a complete aluminum framed system that has been tested and warranted by the manufacturer as a single source system. The exterior insulated single panel can be removed at any time, independently of the interior insulated single panel and without exposing the building's interior. The interior insulated single panel remains intact for the life of the building envelope.
   2. Panel glazing assembly thickness shall be 4" two panel system with concealed interlocking H battens, grid and FR insert. Minimum thickness of the exterior and the interior single panels shall be 0.315" thick each.
   3. Panel Width: Shall not exceed 2' to ensure best performance for wind uplift, vibration, oil canning and visual appearance. Panels over 2' wide will not be approved.

C. Thermal and Solar Performance:
   1. Insulation "U" Value performance per NFRC100 & 700, is required by the California Energy Code. Such performance values must be certified and labeled by NFRC. Labels shall be displayed on the product. NFRC certified and labeled products shall be published in the Certified Products Directory (CPD) on the NFRC official web site.
   2. U value for standard panel assembly with no bat or aerogel insulation, Center of Glazing per NFRC 100**:** 0.20
   3. U value for panel system assembly with no bat or aerogel insulation and including skylight aluminum framing per NFRC100 & NFRC700: 0.31 (for mill finish frame)
   4. Optional - Custom U value with variety of added insulation inserts.
      a. Custom U value center of glazing only per NFRC100, U factor: .18
      b. Custom U value for a complete aluminum frame per NFRC100 & 700 U factor: [ ]
   5. Visible Light Transmission Center of Glass (V.T. %) 22 per ASTM E972 ASTM & E1084.
   6. Solar Heat Gain Coefficient (SHGC) 18 independently tested or calculated based on testing per methods and procedures given in the NFRC Calorimeter
   7. Standard Color: Exterior - Clear; Interior - White Matte

D. Translucent Panel Joint System:
   1. Panel shall be extruded in one single formable length. Transverse connections are not acceptable.
   2. The panels should be manufactured with grip-lock double tooth upstands that are integral to the unit. The upstands shall be 90 degrees to the panel face (standing seam dry glazed concept). Welding or gluing of upstands or standing seam is not acceptable.
   3. The H battens shall have a grip-lock double tooth locking mechanism to ensure maximum uplift capability.
   4. The metal retention clip shall be configured with a 0.4" wide top flange that extends continuously across the web from end to end and from side to side. To allow safety factor, the clip must be tested to meet a wind uplift standard of 90 PSF per ASTM E330. .
   5. Water Penetration: No water penetration of the panel H joint connection length at test pressure of 6.24 PSF per ASTM E-331
   6. Free movement of the panels shall be allowed to occur without damage to the weather tightness of the completed system.

E. Flammability:
   1. The exterior and interior panels shall be an approved light transmitting panel with a CC1 fire rating classification per ASTM D-635. Flame spread no greater than 25 per ASTM E-84. Smoke density no greater than 75 per ASTM D2843 and a minimum self-ignition temperature of 1000°F per ASTM 1929.
   2. Interior flame spread classification of Class A per ASTM E84.
   3. The translucent panel must be listed by an independent recognized listing laboratory after successful evaluation for fire from exterior exposure per ASTM E108, FM 4470, NFPA 256, UBC 32-7, ULC-S107, UL 790 to meet a Class A rating.

F. CalOSHA /OSHA Life Safety Standards 29 CFR 1926.502 (i) (2) and 29 CFR 1910.23 (e) (8):
   1. Panel assembly shall withstand a 300 lb. point load at 5' span per OSHA standard 29CFR 1910 23e8.
   2. Panel assembly shall withstand a 600lb point load over 12 square inches per CalOSHA California Code or Regulations, Title 8, Section 1623(b)(3) & Section 3212(b).

G. Cyclic Wind Load:
   1. Translucent Panels shall be tested for cyclic wind loads and impact resistance per ASTM E 1886-97 and ASTM E 1996-02 at test load to verify the positive and negative design loads and level D impact.

H. Weatherability:
   The light transmission shall not decrease more than 6% as measured by ASTM D-1003 over 10 years, or after exposure to temperature of 300°F for 25 minutes (thermal aging performance standard).
   1. The weathering performance should be justified by successful testing of the glazing panel's performance after exposure to actual Florida weather conditions

for approximately 10 years in comparison to a new panel assembly. This performance must be demonstrated by providing independent lab test reports for the exposed and a new panel assembly of 6' wide x 12' long for:
   a. ASTM 330 - Uniform static air pressure per at negative load of -105psf and positive load of 130psf.
   b. ASTM E695 - Impact loading per of 500 ft. lbs.
   c. ASTM 1886 & ASTM E1996 - Cyclic static air pressure at 65psf and impact level D
2. Test results must show that there is no deterioration in performance for the 10 year's exposed panels versus a new panel.
3. Panels shall be manufactured from polycarbonate resin with a permanent, co-extruded ultra-violet protective layer. Post-applied coatings or films of dissimilar materials are unacceptable.
4. The faces shall not become readily detached when exposed to temperatures of 300°F and 0°F for 25 minutes.
5. The panel shall not change color more than 4.0 units DELTA-E per ASTM D2244 after 60 months outdoor weathering in Arizona as determined by an average of at least two samples.
6. Thermal aging - the interior and exterior panel shall not change color in excess of 0.75 Delta E per ASTM D2244 and shall not darken more than 0.3 units Delta L per ASTM D2244 and shall show no cracking or crazing when exposed to 300°F for 25 minutes.
7. Panel shall be factory sealed at the sill to restrict dirt ingress.

I. Glare and Diffused Light Transmission: to avoid glare per IECC requirements, the panels shall have a matte finish with a minimum Haze measurement of 90% per ASTM D1003.

2.03 METAL FRAME STRUCTURE

A. Design criteria shall be:
   1. Negative design wind Load: See general notes on Structural Drawings.
   2. Positive design wind load: See general notes on Structural Drawings.

B. The skylight framing is designed to be self-supporting between the support constructions. The deflection of the structural framing members in a direction normal to the plane of the glazing, when subjected to a uniform load deflection, shall not exceed L/60 for the unsupported span. The skylight will impose reactions to the support construction. All adjacent and support construction must support the transfer of all loads including horizontal and vertical, exerted by the skylight. Design or structural engineering services for the supporting structure or building components is not included in the skylight scope of this section.

C. Water Penetration: The metal framed skylight panels shall allow no water penetration at a minimum differential static pressure of 6.24 lbs. per sqf per AAMA 501 pressure difference recommendations and as demonstrated by prior testing of typical framing sample per ASTM E-331

D. Water test of metal frame structure shall be conducted according to procedures in AAMA 501.2.

E. Maximum air infiltration rate for fenestration of the two panel assemblies of skylight shall be per NFRC 400.

2.04 METAL MATERIALS

A. Extruded Aluminum shall be ANSI/ASTM B221; 6063-T6: 6063-T5 or 6005-T5.

B. Flashing:
   1. 5005 H34 aluminum
   2. Sheet metal flashings/closures/claddings are to be furnished shop formed to profile - when lengths exceed 10 ft. in nominal 10-ft lengths. Field trimming of the flashing and field forming the ends is necessary to suit as-built conditions. Sheet metal ends are to overlap at least 6-inc. to 8-inc. set in a full bed of sealant and riveted if required.

C. All Fasteners for aluminum framing to be stainless steel or cadmium plated steel, excluding the final fasteners to the building.

D. Exposed Aluminum Finish:
   1. CPICRF™- PREMIUM polymer resin powder coat per AAMA 2604 with 10 years warranty.

PART 3 - EXECUTIONS

3.01 EXAMINATION

A. Verify when structural support is ready to receive all work in this section and to convene a Pre-Installation Conference at least one week prior to commencing work of this Section. Attendance required of General Contractor, skylight installer and all parties directly affecting and effected by the work of this section.

B. All submitted opening sizes, dimensions and tolerances are to be field verified by general contractor unless otherwise stipulated.

C. Installer shall examine area of installation to verify readiness of site conditions. Notify general contractor about any defects requiring correction. Do not work until conditions are satisfactory.

D. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install components in strict accordance with manufacturer's instructions and approved shop drawings. Use proper fasteners, caulking and hardware for material attachments as specified.

B. Use methods of attachment to structure allowing sufficient adjustment to accommodate tolerances.

C. Remove all protective coverings on panels immediately after installation.

D. Align assembly free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Install flashings.

F. Install perimeter type sealant, backing materials and installation requirements in accordance with Section 07 92 00.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
   1. Water-Spray Test: Before installation of interior finishes has begun, panel assemblies shall be tested according to AAMA 501.2 and shall not show evidence of water penetration.
   2. Perform tests on the whole translucent roof assembly.

B. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

C. Prepare test and inspection reports.

3.04 CLEANING

2

A. Follow manufacturer's instructions when washing down exposed panel surfaces using a solution of mild detergent in warm water that is applied with soft, clean wiping cloths. Always test a small area before applying to the entire area.

B. Follow strict panel manufacturer guidelines when removing foreign substances from panel surfaces requiring mineral spirits or any solvents that are acceptable for use. Always test a small sample to validate compliance before applying to the entire glazing panels

C. Installers shall leave panel system clean at completion of installation. Final cleaning is By others upon completion of project, following manufacturer's cleaning instructions.

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Glass and glazing for Sections referencing this Section for products and installation.

B. Related Section(s):
1. Section 08 41 13 Aluminum Entrances and Storefronts
2. Section 08 44 14 Glazed Aluminum Curtain Wall
3. Section 08 87 00 Solar Control Window Film
4. Energy calculations or prescriptive compliance documents

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. 2019 California Building Code, Chapter 24, Table 2403.2.1, Tables 2406.2(1) and 2406.2(2).

C. 2019 California Energy Code, Title 24, Part 6, Subchapter 2, Sections 110.6 and Subchapter 5, Section 140.3.

D. 2019 California Administrative Code, Chapter 10, Sections 10-111 and 10-112.

E. ASTM C1036 - Standard Specification for Flat Glass

F. ASTM C1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass

G. ASTM D792 - Density and Specific Gravity (Relative Density) and Density of Plastics by Displacement.

H. ASTM E 2190 - Insulating Glass Unit Performance and Evaluation

I. GANA - Glass Association of North America - Glazing Manual, Latest Edition

J. GANA - Glass Association of North America - Sealant Manual, Latest Edition

K. AAMA - 92, Voluntary Specification and Test Methods for Sealants

L. GTA - Glass Tempering Division of Glass Association of North America

M. LSGA - Laminators Safety Glass Association - Standards Manual

N. SIGMA - Sealed Insulated Glass Manufacturers Association - Glazing Manual

O. IGMA - Insulating Glass Manufacturers Alliance

P. Chapter 24 , 2019 California Building Code

Q. Section KCMZ, UL Fire Resistance Directory, Volume 3, Latest Edition.

R. California Code of Regulations, Title 24
   1. CBC California Building Code (CBC) 2019
   2. CRSC California Referenced Standards Code, Standard 12-7-4, fire door tests

S. NFPA-80 Fire Doors and Fire Windows

T. NFPA-257 Fire Test for Windows and Glass Block Assemblies

U. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing Material, Consumer Protection Safety Commission, Code of Federal Regulations. All glazing shall pass the test requirements of CPSC 16 CFR 1201, listed in Chapter 35. Comply with the CPSC 16 CFR, Part 1201 criteria, for Category I or II as indicated in Table 2406.1, CBC. Required for fully tempered glass, laminated glass, and wire Glass.

V. ANSI Z-97.1-84 (R1994) - Performance Specifications and Methods of Test for Transparent Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Method of Test. Required for fully tempered glass, laminated glass.

1.03 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass sloped 15 degrees or less from vertical in windows, curtain and window walls, doors and other exterior applications shall be designed to resist the wind load in Section 1609.6.4.4 and Table 1609.6.2(2). Glass in glazed curtain walls, glazed storefronts and glazed partitions shall meet the seismic requirements of ASCE 7, Section 13.5.9. Load resistance under uniform load per ASTM E1300.
   1. Sloped glass: CBC Section 2404.2 and Section 2405 Sloping Glass and Skylights.

C. Provide minimum frame lap in accordance with Table 2403.2.1, California Building Code and Note "*1*" for design wind and earthquake drift.

D. Glazing materials and assemblies shall be tested in accordance with California Referenced Standards Code, Standard 12-7-4 and NFPA 80 Fire Doors and Fire Windows and shall be labeled and installed in accordance with their listing.

E. Glazing in fire door and fire window assemblies subject to human impact loads and in hazardous locations shall comply with requirement of CBC Sections 2406.2 and 2406.4.

F. Air and Water Infiltration per ASTM E283 and ASTM E331.

G. Performance Rating: Glazing U-Factor, Relative Solar Heat Gain Coefficient and Visible Transmittance shall be rated in accordance with the T-24 Energy Report per maxima and minimum requirements in California Energy Code, Subchapter 5, Section 140.3(a)5 and Table 140.3-B.

H. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the CBC and ASCE 7/SEI 7.
   1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
      a. Basic Wind Speed (Ultimate design wind speed): 115 mph
      b. Seismic Importance Factor: 1.25 for schools, Category III
      c. Exposure Category: C
   2. Maximum Lateral Deflection: To be considered firmly supported, the framing members for each individual pane of glass shall be designed so the deflection of the edge of the glass perpendicular to the glass panel shall not exceed 1/175 of the glass edge length or 3/4-inch, whichever is less, when subjected to the larger of the positive or negative load where loads are combined as specified in CBC Section 1605A. CBC Section 2403.3.

1.04 SUBMITTALS

A. Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

B. Three samples of each material specified illustrating coloration and design.

C. Submit certification of Manufacturer’s Certified Fabricators.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Glass Fabricators: Member of manufacturer’s Certified Fabricator Program (CFP)
   1. Program members participate in rigorous training program on processing of sophisticated glass products, including high-performance coated glasses.
   2. Subject to comprehensive, multiple-day audit addresses glass fabrication equipment as well as their documented processing procedures.

C. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from single manufacturer for each product and installation method indicated.

D. Perform Work in accordance with:
1. GANA Glazing Manual.
2. GANA Sealant Manual.
3. LSGA Standards Manual.
4. IGMA/SIGMA Glazing Manual, Class CBA.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

1.07 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.08 COORDINATION

A. Coordinate the Work with glazing frames, wall openings, and perimeter air and vapor seal to adjacent Work.

1.09 WARRANTY

A. Provide one-year manufacturer's warranty from Date of Substantial Completion for defective products including broken, cracked or otherwise damaged glass not caused by vandalism. Water intrusion through sealant/glass joint.

B. Manufacturer's Special Warranty: Include 10 years coverage for sealed glass units from seal failure, interpane dusting or misting and replacement of same.

C. Manufacturer's Special Warranty: Include 10 year silver spoilage coverage for reflective coating on mirrors and replacement of same.

1.10 IDENTIFICATION

A. Each pane shall bear the manufacturer's mark designating the type and thickness of glass and glazing material. Conform to Section 2403.1, California Building Code. Safety glass shall be identified in accordance with CBC Section 2406.3.

B. Each pane of safety glazing material installed in hazardous locations required per Section 2406.1 and as defined in Section 2406.3 Chapter 24, California Building Code. Safety glass shall be identified by a label which will specify the labeler, whether the manufacturer or installer, and state that safety glazing material has been utilized in such installation.
1. Identification shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of that type once applied, cannot be removed without being destroyed, on glass and readable from inside of building after installation.
2. Label text shall comply with Section 2406.3.

C. Each pane of tempered glass, except tempered spandrel glass, shall be permanently indentified by the manufacturer. The identification mark shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of the type that once applied cannot be removed without being destroyed. Tempered spandrel glass shall be provided with a removable paper marking by the manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS - FLAT GLASS MATERIALS

A. Products of following manufacturers form basis for design and quality intended.
   1. Vitro Architectural Glass, Pittsburgh, PA.
   2. Guardian Industries Corp. Kingsburg, CA, Corsicana TX.
   3. Pilkington Libbey-Owens-Ford Co, Toledo, OH.
   4. Saint-Gobain Corp.

B. Products of following fabricators form basis for design and quality intended.
   1. Solutia/Vanceva Laminated Glass/Oldcastle, St. Louis, MO.
   2. Envelope Corp.
   3. ASI Glass/SCHOTT Group, Elmsford, NY.
   4. Viracon Inc. Owatonna, MN.

C. Or equal as approved in accordance with Division 01, General Requirements for Substitutions.

2.02 GLASS MATERIALS

A. GL1: Insulating Glass Units, Low-E Coated: double pane with silicone sealant edge secondary seal and polyisobutylene primary seal with aluminum spacer, clear anodized. Outboard lite of tinted 1/4 inch heat-strengthened glass, ASTM C1048, Kind HS. Inboard lite of 1/4 inch clear tempered, Kind FT, glass, Category I, CPSC 16 CFR 1201. Category II for units less than 18" above floor, and top edge greater than 36". Low-E coating on surface 2, interpane space purged dry air; total unit thickness of one inch. Solarban 70.
   1. Vitro Solarban 70 - Low- E Tinted Insulating Glass, sputter-coated
      a. Solarban 70 (2) Clear + Clear
         1) Visible Light Transmittance of 64%, solar heat gain coefficients of 0.27.

2

B. GL2: Insulating Glass Units, Low-E Coated with Solar Control Window Film: double pane with silicone sealant edge secondary seal and polyisobutylene primary seal with aluminum spacer, clear anodized. Outboard lite of tinted 1/4 inch heat-strengthened glass, ASTM C1048, Kind HS. Inboard lite of 1/4 inch clear tempered, Kind FT, glass, Category I, CPSC 16 CFR 1201. Category II for units less than 18" above floor, and top edge greater than 36". Low-E coating on surface 2, interpane space purged dry air; total unit thickness of one inch. Solarban 70.
   1. Vitro Solarban 70 - Low- E Tinted Insulating Glass, sputter-coated
      a. Solarban 70 (2) Clear + Clear
         1) Visible Light Transmittance of 64%, solar heat gain coefficients of 0.27

2

2. Solar Control Window Film on Surface 4 per Section 08 87 00, Solar Control Window Film.

C. GL3: Insulating Glass Units, Low-E Coated with Shadow Box: double pane with silicone sealant edge secondary seal and polyisobutylene primary seal with aluminum spacer, clear anodized. Outboard lite of tinted 1/4 inch heat-strengthened glass, ASTM C1048, Kind HS. Inboard lite of 1/4 inch clear tempered, Kind FT, glass, Category I, CPSC 16 CFR 1201. Category II for units less than 18" above floor, and top edge greater than 36". Low-E coating on surface 2, interpane space purged dry air; total unit thickness of one inch. Solarban 70.

1. Vitro Solarban 70 - Low- E Tinted Insulating Glass, sputter-coated
   a. Solarban 70 (2) Clear + Clear
      1) Visible Light Transmittance of 64%, solar heat gain coefficients of 0.29.

2
2. Shadow Box at Vision Glass: Screw attach formed sheet metal within mullion frame behind insulating glass, seal tight surrounding edges to prevent migration of warm moist air to inside shadow box. Paint metal per Architect's selected color. Drain cavity to exterior to prevent trapped condensation water. Provide rigid insulation behind sheet metal, insulation on interior side with foil faced surface.
   a. Mockup: provide mockup of shadow box for approval by Architect.

D. GL4: Insulating Glass Units, Low-E Coated with Solar Control Window Film and Shadow Box: double pane with silicone sealant edge secondary seal and polyisobutylene primary seal with aluminum spacer, clear anodized. Outboard lite of tinted 1/4 inch heat-strengthened glass, ASTM C1048, Kind HS. Inboard lite of 1/4 inch clear tempered, Kind FT, glass, Category I, CPSC 16 CFR 1201. Category II for units less than 18" above floor, and top edge greater than 36". Low-E coating on surface 2, interpane space purged dry air; total unit thickness of one inch. Solarban 70.

1. Vitro Solarban 70 - Low- E Tinted Insulating Glass, sputter-coated
   a. Solarban 70 (2) Clear + Clear
      1) Visible Light Transmittance of 64%, solar heat gain coefficients of 0.29.

2
2. Shadow Box at Vision Glass: Screw attach formed sheet metal within mullion frame behind insulating glass, seal tight surrounding edges to prevent migration of warm moist air to inside shadow box. Paint metal per Architect's selected color. Drain cavity to exterior to prevent trapped condensation water. Provide rigid insulation behind sheet metal, insulation on interior side with foil faced surface.
      1) Mockup: provide mockup of shadow box for approval by Architect.
3. Solar Control Window Film on Surface 4 per Section 08 87 00, Solar Control Window Film.

E. GL5: Safety Glass at all interior glazing, unless noted otherwise: ASTM C1048, Kind FT fully tempered, Condition A uncoated, Type I transparent glass, Class 1 Clear, Quality-Q3 Glazing select, 3/8 inch thick minimum. All safety glass shall pass the test requirements of CPSC 16 CFR 1201 criteria, for Category I or II as indicated in Table 2406.2(1), CBC and below, and for Hazardous locations per Section 2406.4:

1. 9 sq. ft. or less: Category I
2. More than 9 sq. ft.: Category II
3. Refer to Section 10 22 19 for additional glazing information at Demountable Partitions.

F. GL6: Safety Glass with Shadow Box: ASTM C1048, Kind FT fully tempered, Condition A uncoated, Type I transparent glass, Class 1 Clear, Quality-Q3 Glazing select, 3/8 inch thick minimum. All safety glass shall pass the test requirements of CPSC 16 CFR 1201 criteria, for Category I or II as indicated in Table 2406.2(1), CBC and below, and for Hazardous locations per Section 2406.4:
1. 9 sq. ft. or less: Category I
2. More than 9 sq. ft.: Category II
3. Shadow Box at Vision Glass: Screw attach formed sheet metal within mullion frame behind insulating glass, seal tight surrounding edges to prevent migration of warm moist air to inside shadow box. Paint metal per Architect's selected color. Drain cavity to exterior to prevent trapped condensation water. Provide rigid insulation behind sheet metal, insulation on interior side with foil faced surface.
   a. Mockup: provide mockup of shadow box for approval by Architect.

2.03 MIRROR GLASS

A. Mirror Glass: Vinyl-backed safety mirror glass , per CPSC 16 CFR 1201, Category II and ANSI Z-97.1, 1/4 inch thick minimum, sizes as noted on Drawings.
1. Frame: Frame face 3/4 x 3/4 inch welded seamless stainless steel, No. 304 finish, 20 gauge galvanized steel backing, Series No. 290, by Bobrick Washroom Equipment Inc., North Hollywood, CA, or equal.
2. Edges: Flat polished edges.
3. Mounting: concealed mounting wall hangers with theft-resistant locking devices.
4. For unframed mirrors: stainless steel edge channels at top and bottom and mastic bond to wall. Flat polish, ground arris (bevel) at exposed edges, UNO.
5. Mirror Mastic: Adhesive setting compound and barrier coat, produced specifically for setting mirrors, compatible with glass coating and substrate on which mirrors will be installed, Gunther Mirror Mastics, Palmer Products Incorporated or equal.

2.04 GLAZING ACCESSORIES

A. Setting Blocks: 80-90 Shore A Durometer Hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: 40-50 Shore A Durometer Hardness, minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self-adhesive on one side.

C. Glazing Tape, minimum 1/8" thick, 1/2" wide, the following:
1. Preformed butyl compound with integral resilient tube spacing device; 10 - 15 Shore A Durometer Hardness; coiled on release paper; black color.

2. Expanded Cellular Glazing tape, closed-cell, PVC foam tapes, factory coated with adhesive of both surfaces, coiled with released liner, complying with AAMA 800. Type 1 for tape acting as primary sealant, Type 2 tape combination with full bead of sealant.

D. Glazing Splines: Resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot.

E. Sealants: for color sealants; DowSil 795 Silicone or as specified in Section 07 92 00. Use Pecora 895 Structural Glazing for translucent and structural glazing applications or Tremco Spectrem 2 clear or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify prepared openings.

B. Verify that openings for glazing are correctly sized and within tolerance.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Mirror Glass: flat polish edge treatment. Edge Sealer: Seal edges for mirror glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.

3.03 EXTERIOR - DRY METHOD (PREFORMED GLAZING)

A. Cut glazing spline to length; install on glazing pane. Seal corners by butting spline and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing. Exert pressure for full continuous contact. Seal stop-screw holes and fill screw tips with silicone before installing.

3.04 EXTERIOR - DRY/WET METHOD (PREFORMED TAPE AND SEALANT)

A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

B. Apply toe bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

D. Rest glazing on setting blocks and push against tape and toe bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

E. Install removable stops, with spacer shims inserted between glazing and applied stops 1/4 inch below sight line. Place glazing tape on glazing panel or unit with tape flush with sight line. Seal stop screw holes and fill screw tips with silicone before installing.

F. Fill gap between glazing and stop with silicone type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

G. Apply cap bead of silicone type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.05 EXTERIOR - WET METHOD (SEALANT AND SEALANT)

A. Place setting blocks at 1/4 points and install glazing pane or glass unit.

B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line. Seal stop screw holes and fill screw tips with silicone before installing.

C. Fill gaps between glazing and stops with silicone type sealant to depth of bite on glazing, but not more than 3/8 inch below sight line, to ensure full contact with glazing and continue the air and vapor seal.

D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.06 INTERIOR - DRY METHOD (TAPE AND TAPE)

A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

D. Place glazing tape on free perimeter of glazing in same manner described above.

E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact. Seal stop screw holes and fill screw tips with silicone before installing.

F. Knife trim protruding tape.

3.07 INTERIOR – DRY/WET METHOD (TAPE AND SEALANT)

A. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or glass unit.

D. Install removable stops, with spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line. Seal stop-screw holes and fill screw tips with silicone before installing.

E. Fill gaps between pane and applied stop with silicone type sealant to depth equal to bite on glazing, to uniform and level line.

F. Trim protruding glazing tape edge.

3.08 MANUFACTURER'S FIELD SERVICES

A. Glass and glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures, unacceptable conditions and report deficiencies to the Architect.

3.09 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean and polish surfaces and frames.

3.10 PROTECTION OF FINISHED WORK

A. Protect finished Work.

B. After installation, mark pane with an 'X' by using removable plastic tape or paste. Do not mark heat absorbing glass units.

END OF SECTION

SECTION 09 90 00

PAINTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Fluid applied paints and coatings. Upon completion of Work, all visible interior and exterior surfaces, within the Contract limits [including factory primed or factory finished roof mounted mechanical and electrical equipment,] shall be painted unless scheduled "Not to Be Painted in this Section."
   1. Each paint system includes:
      a. Surface preparation, including touch-up of shop applied primers, if needed.
      b. Prime coat application, where scheduled as part of finish system.
      c. Finish coat application, where scheduled apply two or more finish coats.
   2. Paint semi-concealed areas (e.g. inside of light troughs and valances, behind grilles, and projecting edges above and below sight lines, behind wall-mounted items).

B. Surfaces Not to be Painted:
   1. Prefinished wall, ceiling, and floor coverings.
   2. Items with factory-applied final finish [except roof-mounted equipment as defined above].
   3. Concealed ducts, pipes, and conduit.
   4. Glass, plastic laminate, ceramic tile, anodized aluminum.
   5. Surfaces of steel items that will be embedded in concrete.
   6. Surfaces specifically scheduled or noted on the Drawings not to be painted.
   7. Fire-Rating labels on doors and frames.
   8. Performance labels on doors and frames.

C. Related Sections:
   1. Section 01 35 42, CALGreen Requirements.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ASTM International - American Society for Testing and Materials
   1. ASTM D 4442 - Direct Moisture Content Measurement of Wood and Wood-Base Materials.
   2. ASTM D 4444 - Use and Calibration of Hand-Held Moisture Meters.
   3. ASTM D 6386 - Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.

C. California Green Building Standards Code, CALGreen 2019.

D. SCAQMD - South Coast Air Quality Management District: SCAQMD-1113 - Rule 1113, Architectural Coatings.

E. SSPC - Steel Structures Painting Council.

1.03 SUBMITTALS

A. CALGreen Submittals:
   1. Product Data Sheets and Declaration Statements showing compliance with CALGreen Code per 1.06.A.

B. Product Data: For each paint system product and accessory item.
   1. Container Labels and Technical Data Sheets shall contain the same/complete product name and numbers. The word "series" will not be excepted.

C. Samples: Of each specified finish system color, texture, and sheen; samples shall be minimum 8-1/2 by 11 inches in size.
   1. Prepare transparent wood finish samples on type and quality of wood specified.

D. Certified copies of moisture test results.

E. Informational Submittals:
   1. Statement of Qualifications from manufacturer.
   2. Statement of Qualifications from installer.
   3. Manufacturer’s application instructions.

2

F. Closeout Submittals:
   1. Material Safety Data Sheets.
   2. Drawdown samples with the manufacturer's same/complete product name and numbers. The word "series" will not be excepted.

G. Submit Qualifications data for manufacturer and applicator required under Quality Assurance.

2

1.04 MAINTENANCE MATERIALS AND SUBMITTALS

A. For each color, type, and gloss of paint used in the work provide, as Extra Materials, a quantity equal to approximately 5 percent of the quantity required for its installation rounded to the nearest gallon, or five gallons, whichever is less.
   1. Extra Materials shall be from the same production run as installed materials.
   2. Label each container with locations and dates of related installations; do not obscure manufacturer’s label.
   3. Deliver Extra Materials to Site as directed by Owner.

1.05 QUALITY ASSURANCE

A. California Green Building Standards Code, CALGreen 2019.
   1. Adhesives, sealants, primers and caulks shall comply with air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, per CALGreen Tables 5.504.4.1 and 5.504.4.2.

2. Paints and Coatings shall comply with VOC limits in Table 1 of the ARB, per CALGreen Table 5.504.4.3.

B. Manufacturer's Qualifications: Company with minimum 10-years' experience manufacturing quality paint and finish products for commercial projects similar in scale and complexity to those required for this Project.

C. Applicator Qualifications: Company with minimum 5-years' experience painting and finishing commercial projects similar in scale and complexity to those required for this Project.

D. Materials, for each paint system, shall be by, or as recommended by, a single coating manufacturer for use together in commercial quality paint / coating system for the substrate and exposure conditions indicated.

E. Regulatory Requirements
1. Conform to SCAQMD-1113 for maximum VOC limits.
2. Comply with applicable codes and regulations of authorities having jurisdiction including those with jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provisions.

F. Field Samples: Provide Field Sample of each finish system color, texture, and sheen scheduled. Do not proceed with coating application until sample panel has been approved.
1. Field Sample shall be full height of wall by 10-feet.
2. Locate as approved by Architect.
3. Adjust materials and methods of installation as required to obtain Architect's approval.
4. Document materials and methods used to obtain Architect’s approval and maintain at least one copy of this documentation on site while related work is in progress.
5. Maintain access to and protect Field Sample from damage while related work is in progress.
6. Upon acceptance of related work, approved sample may remain as part of Work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site in their original, sealed, undamaged containers with labels intact and legible.
1. Labels shall include manufacturer’s name, type of paint, brand name, brand code, color designation, recommended surface preparation, typical coverage, drying times, cleanup procedures, and instructions for mixing and reducing, if permitted.

B. Store paint materials ambient temperatures between 45- and 90-degrees F, in well ventilated area unless permitted otherwise by manufacturer’s instructions.

C. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.07 FIELD CONDITIONS

A. Supply continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45-degrees F for 24-hours before, during and 48-hours after application of finishes, unless permitted otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain, or when relative humidity is above 50 percent, unless permitted otherwise by manufacturer's instructions.

C. Minimum application temperatures for Latex Paints: 45-degrees F for interiors; 50-degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum application temperature for Varnish and Transparent Finishes: 65-degrees F for interior or exterior, unless permitted otherwise by manufacturer's instructions.

E. Maintain lighting level sufficient to conduct painting operations.

1.08 GUARANTEE

A. Guarantee the painting Work against peeling, fading, cracking, blistering or crazing for a period of two years form the Date of Certified Completion for painting of new surfaces and existing surfaces.

PART 2 - PRODUCTS

2.01 PAINTS AND COATINGS

A. Acceptable Manufacturers: Products of following manufacturers form basis for design and quality intended.
   1. Dunn-Edwards Corporation, Los Angeles, CA.

B. Or equal, approved in accordance with Division 01, General Requirements, for substitutions.

2.02 MATERIALS

A. Coatings: Ready mixed, except field-catalyzed coatings. Process pigments to soft past consistency, capable of being readily and uniformly dispersed to homogenous coating.

B. Colors and Glosses: As scheduled in Finish Schedule on Drawings. Architect will select color and hue to be used in various types of paint specified and will be sole judge of acceptability of various glosses obtained from materials proposed to be used in Work. During actual painting, Architect may make minor modifications in tone and shade to adjust for actual surface and lighting conditions encountered.

C. Undercoats and Thinners: Provide undercoat paint produced by same manufacturer as finish coat. Use only thinners recommended by paint manufacturer and use only to recommended limits. Use undercoat, finish coat and thinner material as parts of a unified system of paint finish.

D. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

E. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified of commercial quality.

2.03 APPLICATION EQUIPMENT

A. For application of the approved paint, use only such equipment as is recommended by the manufacturer.

B. Compatibility: Prior to actual use of application equipment, use all means necessary to verify that the proposed equipment is actually compatible with the material to be applied and that the integrity of the finish will not be jeopardized by the use of the proposed application equipment.

2.04 FINISHES

A. Refer to schedule at end of Section for surface finish and Finish Schedule. Notwithstanding product numbers listed in schedule, Contractor shall conform to most recent product numbers as published by the manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of Work. Report any condition that may potentially affect proper application.

C. Measure moisture content of new surfaces using an electronic moisture meter. Apply finishes only when moisture content of surfaces are below the following maximums. Conduct moisture measurements in presence of the project inspector, document readings and submit to Architect under Part 1.
   1. Gypsum Wallboard: 12 percent.
   2. Interior Located Wood: 15 percent, measured in accordance with ASTM D 4442 and ASTM D 4444.

D. Beginning installation means acceptance of existing surfaces and conditions.

3.02 MATERIALS PREPARATION

A. Mix and prepare painting material in accordance with manufacturer’s recommendations.

B. Store materials not in actual use in tightly covered containers.

C. Maintain containers used in storage, mixing and application of paint in a clean condition, free from foreign materials and residue.

D. Stir all materials before application to produce a mixture of uniform density and as required during the application of materials. Do not stir into the material any film that may form on the surface. Remove the film and strain the material before using.

3.03 SURFACE PREPARATION

A. Remove electrical plates, hardware, light fixture trim and fittings prior to preparing surfaces for finishing.

B. Correct minor defects and clean surfaces which surfaces which affect Work of this section.

C. Shellac and seal marks that may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Insulated Coverings: Remove dirt, grease and oil from canvas and cotton.

F. Gypsum Board Surfaces: Fill minor defects, joints and nail head depressions with spackling compounds. Prime in accordance with primer manufacturer’s recommendations. Apply primer over skim coat for Level 5 finish.

G. Surface Preparation for Exterior Metal (Except Galvanized): Preparation in accordance with SSPC-6 Commercial Blast Cleaning.

H. Galvanized Surfaces:
   1. Prepare galvanized steel and nonferrous metal surfaces in accordance with SSPC-SP16 Brush Off Blast Cleaning Method for Coating and Uncoated Galvanized Steel and Non Ferrous Metals OR ASTM D 6386-Surface Preparation of Galvanized Surfaces, and as well as manufacturer's instructions.
   2. Ensure surfaces are dry.
   3. Interior Exposure (Dry/Benign): Remove visible, oil, grease, dirt, dust, protective mill coatings, and other soluble contaminants in accordance with SSPC-SP 1 or manufacturer’¢s instructions as specified for coating system. Hand or Power tool clean to remove all insoluble contaminants.
   4. Interior and Exterior Exposure (moderate to severe): Remove visible oil, grease, dirt, dust, protective mill coatings, and other soluble contaminants in accordance with SSPC-SP 1 or manufacturer’¢s instructions as specified for coating system. Follow initial cleaning with one of the following Methods:
      a. SURFACE PREPARATION METHOD A (Preferred): Prepare Galvanized Steel to be painted according to SSPC-SP16 Brush Off Blast Cleaning for Coated and Uncoated Galvanized Steel and Non Ferrous Metals OR Thoroughly roughen the entire surface to be coated using compressed air brush off blast cleaning with a fine abrasive to achieve a uniform anchor profile of 1-2 mils. reference ASTM D 6386-99 Section 5.4.1.

b. SURFACE PREPARATION METHOD B (Alternative method when Method A is not feasible): Chemically Treat with one of the following products to etch the galvanized surface to be coated: Henkel Galvaprep 5 or Clean ‘Ün Etch by Great Lakes Laboratory. Reference ASTM D 6386-99 Section 5.4.2.

I. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Prime paint after repairs with Tnemec Series L69 Hi Build Epoxoline II or Carboline 890 VOC or approved in accordance with Division 01, General Requirements for Substitutions.

J. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Spot prime bare steel surfaces to match existing primer.

K. Wood Scheduled to Receive Paint Finish: Remove dust, grit and foreign matter. Seal knots, pitch streaks and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

L. Wood Doors and Cabinet Work schedules for field-applied transparent or solid stain finish:
1. Sand surfaces thoroughly with a 5/0, 180 grit sandpaper.
2. Apply coatings as specified in the schedule to all surfaces, sides and edges. Avoid streaking or uneven application. Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail or screw holes, or other surfaces imperfections.
3. Stains as selected by Architect from manufacturer’¢s full range of colors.
4. Provide satin finish for final coats.

M. Wood Doors Scheduled for Painting: Seal top and bottom edges with primer. Leave labels intact and readable.

N. Door and Window Frames, Side Lights, Jambs and Headers: clean and light sand smooth.

3.04 PROTECTION

A. Protect elements surrounding the Work of this Section from damage or disfiguration.

B. Repair damage to other surfaces caused by Work of this Section.

C. Furnish drop cloths, shields and protective methods to prevent spray or droppings from disfiguring other surfaces.

D. Remove empty paint containers from site.

3.05 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish. Number of coats specified is a minimum. Additional coats shall be applied at no extra cost, if coatings show evidence of uneven application, uneven pigmentation, brush strokes or otherwise unsatisfactory distribution of material.

D. Under coats shall be lighter and brighter in tint that finish coat.

E. Sand lightly between coats to achieve required finish.

F. Allow applied coat to dry before next coat is applied.

G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

H. Prime back surfaces of interior and exterior woodwork with primer paint.

I. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with floss varnish reduced 25 percent with mineral spirits.

J. Seal tops, bottoms and cutouts for hardware and accessories of wood doors.

K. Paint Frames: Split paint door frames to match color of walls on each side of opening unless directed otherwise by Architect.

L. Exterior fascia, trims, reveals, and ornamental fences and gates shall receive accent paint colors different from field paint color.

M. Paint finish shall continue through behind all wall-mounted items (e.g. markerboards, chalk and tack boards).

3.06 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Divisions 22, 23, and 26 for color coding and identification banding requirements of equipment, ductwork, piping and conduit.

1. Unless otherwise indicated, conform to the following color coding system:

PIPING	COLOR	MANUFACTURER
Chilled Water	Vista Gray	Benjamin Moore
Condensed Water	Canvas Tan	Sherwin Williams SW1129
Domestic Hot Water	Admiral Blue	Benjamin Moore 2065-10
Domestic Cold Water	Edison Blue	-
Clinical Air	Bright Yellow	Benjamin Moore
Plant Air	Clear Lacquer	-
Vacuum	Shasta White	-
Oxygen	John Deere Green	Coast-to-Coast 555-2221-2744-02

	Rust-Oleum H-3-matches 594 green	
	Pittsburg 9-15	
	PPG PT-60	
Nitrous Oxide	OSHA Blue	OSHA's Website
Cold Soft Water	OSHA Violet	OSHA's Website
Steam Caterpillar	Yellow	Rust-Oleum H-4
Soil Waste	Loam Brown	-
Nitrogen	OSHA Black	OSHA's Website
Fire	OSHA Red	OSHA's Website
Fuel Gas	OSHA Orange	OSHA's Website
Deionized Water	Light Blue	Benjamin Moore

2. Verify appropriate specific color designations with paint manufacturer.
3. Conform to Owner's special requirements for color coding. Match existing coding system where required.

B. Paint shop primed equipment.

C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

D. Paint mechanical wall louvers, grilles to match adjacent wall surfaces at accent paint finish.

E. Prime and paint insulated and exposed pipes, electrical equipment including panelboards and switch gear, conduit, boxes, insulated and exposed ducts, hangers, metal louvers, brackets, collars and supports, when exposed to view in equipment rooms and finished occupied spaces. Except items that are pre-finished.

F. Replace identification markings on mechanical or electrical equipment when painted accidently.

G. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers and grilles to match face panels.

H. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

I. Color code equipment, piping, conduit and exposed ductwork in accordance with requirements indicated. Color band and identify with flow arrows names and numbering, using stencils or other approved systems.

J. Replace electrical plates, hardware, light fixture trim and fittings removed prior to finishing.

3.07 CLEANING

A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.

B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris.

C. Collect cotton waste, cloths, and material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.08 FINISH SYSTEM SCHEDULE - EXTERIOR EXPOSURE

A. Ferrous - Eggshell - Acrylic
   1. Primer, 1 Coat
      a. Dunn-Edwards BRPR00
   2. Tie Coat, 1 Coat
      a. Dunn-Edwards SSHL30
   3. Finish, 1 Coat
      a. Dunn-Edwards SSHL30

B. Ferrous - Factory Primed: If shop primer is compatible with finish materials, clean and touch-up prime coat in lieu of full primer coat then apply paint finish as specified.

C. Galvanized Steel and Aluminum - Eggshell - VOC Compliant:
   1. Surface Prep
      a. Dunn-Edwards SCME-01
   2. Primer, 1 Coat
      a. Dunn-Edwards ULGM00
   3. Finish, 2 Coats
      a. Dunn-Edwards SSHL30

3.09 FINISH SYSTEM SCHEDULE - INTERIOR SURFACES

A. Gypsum Board - Eggshell - Acrylic (Skim Coat Required for Level 5 Finish):
   1. Primer, 1 Coat
      a. Dunn-Edwards VNPL00
   2. Tie Coat, 1 Coat
      a. Dunn-Edwards SWLL30
   3. Finish, 2 Coats
      a. Dunn-Edwards SWLL30

B. Ferrous - Eggshell - Acrylic:
   1. Primer, 1 Coat
      a. Dunn-Edwards BRPR00
   2. Tie Coat, 1 Coat
      a. Dunn-Edwards SWLL30
   3. Finish, 2 Coats
      a. Dunn-Edwards SWLL30

C. Ferrous - Factory Primed: If shop primer is compatible with scheduled finish, clean and touch up prime coat then apply finish as scheduled.

D. Galvanized and Aluminum - Eggshell - Acrylic:
   1. Surface Prep

a. Dunn-Edwards SCME-01
2. Primer, 1 Coat
a. Dunn-Edwards ULGM00
3. Finish, 2 Coats
a. Dunn-Edwards SWLL30

3.10 SPECIAL COATING SYSTEMS

A. High Performance Coatings (Special Coatings): Exterior; metal handrails, railings, guardrails, roof sheet metal flashings, ladders, galvanized structural steel, structural steel, Architecturally Exposed Structural Steel (AESS), roof screens, trash and equipment enclosures, exterior metal stairs, roof hatches, and scheduled items in Section 05 50 00 Metal Fabrications. Total 5.0 to 8.5 mil thickness, as recommended by the manufacturer. Colors to be selected by Architect. Prepare surfaces and apply finishes per manufacturer's specifications.
1. Unprimed or Shop Primed - Ferrous - Gloss - Polyurethane:
a. Primer, 1 Coat
1) PPG Amerlock 2 VOC
2) Tnemec L69
3) Sherwin Williams B58-620
4) Carboline Carbomastic 15
b. Finish, 2 Coats
1) PPG Amerishield VOC
2) Tnemec 1080
3) Sherwin Williams B65-625
4) Carboline Carbothane 134 MC
2. Unprimed or Shop Primed - Ferrous - Semi-Gloss - Polyurethane:
a. Primer, 1 Coat
1) PPG Amerlock 2 VOC
2) Tnemec L69
3) Sherwin Williams B58-620
4) Carboline Carboguard 890 VOC
b. Finish, 2 Coats
1) PPG Amershield VOC
2) Tnemec 1081
3) Sherwin Williams B65-630
4) Carboline Carbothane 133 VOC
3. Galvanized or Aluminum - Gloss - Polyurethane:
a. Primer, 1 Coat
1) PPG Amerlock 2 VOC
2) Tnemec L69
3) Sherwin Williams B58-620
4) Carboline Galoseal WB
b. Finish, 2 Coats
1) PPG Amerishield VOC
2) Tnemec 1080
3) Sherwin Williams B65-625
4) Carboline Carbothane 134 MC
4. Galvanized or Aluminum - Semi-Gloss - Polyurethane:

a. Primer, 1 Coat
   1) PPG Amerlock 2 VOC
   2) Tnemec L69
   3) Sherwin Williams B58-620
   4) Carboline Carboguard 890 VOC
b. Finish, 2 Coats
   1) PPG Amerishield VOC
   2) Tnemec 1081
   3) Sherwin Williams B65-630
   4) Carboline Carbothane 133 MC

END OF SECTION

SECTION 12 59 17

WALL SYSTEMS FURNITURE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Structural wall framing system

B. Wall skins.

C. Frames for doors and glazed openings.

D. Doors and door hardware.

E. Glass and Glazing.

F. Misc. trims for junctions and building interface.

G. Modular power, monitor shrouds and other technology interface

H. Acoustic insulation.

1.02 PERFORMANCE REQUIREMENTS AND REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. ANSI/BIFMA
1. Wall units will support a maximum load of 331 lbs. per linear foot per side in compliance with ANSI/BIFMA X 5.6.

C. ASTM: American Society for Testing and Materials
1. ASTM E84 “Standard Method for Surface Characteristics of Building Materials”.
2. ASTM E 72 “Standard Test Methods of Conducting Strength Tests of Panels for Building Construction”.
3. ASTM E 90 “Method for Laboratory Measurements of Airborne Sound Transmission Loss of Building Partitions”.

D. Underwriters Laboratories
1. Pre-wired modular power components shall be UL 183 listed

E. 2019 California Building Code.

F. 2019 California Electrical Code.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data for specified products.

B. Submit detailed shop drawings, showing all elements of the system, including fabrication and installation details, fastenings, accessories, types of material and finishes.

C. Shop drawings to include product reference detail to link individual wall components to factory orders and packing lists.

D. Product certification of compliance with specified performance characteristics and criteria, and physical requirements.

E. Manufacturer’s installation and assembly instructions.

F. Closeout Submittals

G. Warranty documents as specified.

H. Maintenance data.

1.04 QUALITY ASSURANCE

A. Installation shall be by manufacturer’s or a qualified dealer's trained personnel.

B. Supplier shall take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work.

1.05 DELIVERY, HANDLING AND STORAGE

A. Deliver wall components containerized, cartoned or crated to provide protection during transit. Include with bid any necessary storage precautions required for the product being offered.

B. Installation shall not commence until building is enclosed and climate controlled, and finishing operations, including adjacent walls, ceiling (including lighting, sprinklers & HVAC), floor-covering and painting, are complete.

C. Relocatable wall installer to inspect partition components upon delivery for damage. Minor damages may be repaired provided the finish items are equal in all respects to new work and acceptable to the owner’s representative. Remove and replace damaged items as described.

D. It shall be the responsibility of the wall supplier to properly package all components for storage and define storage program to be provided on site by General Contractor at no charge, to ensure product performance.

E. Relocatable wall components shall be tagged and labeled with identification numbers that correspond to product reference numbers as called out on shop drawings.

1.06 WARRANTY

A. Submit manufacturer's standard warranty document. Product shall be covered under limited lifetime warranty.

PART 2 - PRODUCT

2.01 ACCEPTABLE MANUFACTURERS AND MODELS

A. Steelcase, Grand Rapids, MI Model: IRYS POD

B. Or approved equal in accordance with Division 01, General Requirements for Substitutions.

2.02 RELOCATABLE WALL SYSTEM

A. Refer to Finish Schedule on Drawings for Finishes.

B. Relocatable, non-progressive, capable of four direction lateral expansion with reusable components.
   1. Wall Thickness: 4" nominal
   2. Wall height: 8'-1.25" high
   3. Vertical and horizontal joinery: ¼" reveal
   4. Utility Wireways: Provide access through structural framing, junctions, end conditions and utility panels.

C. Performance Requirements
   1. Solid painted wall assemblies to have a Class-A rating in accordance with ASTM E84-97a "Standard Method for Surface Characteristics of Building Materials".
   2. All solid and framed glass systems are in compliance with ASTM E 72 "Standard Test Methods of Conducting Strength Tests of Panels for Building Construction".
   3. Solid wall sound attenuation capabilities will range from a minimum (requiring no field additive insulation or gaskets) of 42 STC to a maximum STC level of 52.
   4. Glazed wall sound attenuation capabilities will range from a minimum of 30 STC to a maximum STC level of 33 for single glazed construction, and

will range from a minimum of 42 STC to a maximum STC level of 44 for double glazed construction.

5. Solid wall units will support a maximum load of 331 pounds per linear foot per side in compliance with ANSI/BIFMAX5.6.

D. Wall design will accommodate ceiling heights up to 12’-0”

E. Solid skins and glass frames shall be vertically oriented up to 142” high or landscape oriented up to 120” wide

F. Vertically oriented skins and glass frames shall be a maximum of 60” wide. Landscape oriented skins and glass frames shall be a maximum of 60” high

G. Design must permit extension in two, three or four way conditions without removal of adjacent panels or floor track

H. All solid and fabric skins shall be capable of field cutting to accommodate end filler conditions or other modifications to overall partition length

I. The system shall provide a 3” vertical adjustment (+/-1½ ") in overall height to accommodate floor and ceiling irregularities, allowing for a maximum of +/- 3/4 " at the floor and +/- 3/4 " at the ceiling, including wall assemblies, doors and door frames.

2.03 WALL COMPONENTS

A. Solid skins shall be ¾” thick, with surfaces of powder coat painted steel (22 gauge), fabric wrapped steel, veneer, or laminate (LPL or HPL), enclosing a particle board substrate.

B. Markerboard skins will be clad with ceramic steel dry-erase surfaces.

C. Markerboard skin options to include embedded technology for interacting with projectors and computers.

D. Monitor shrouds will allow for surface mounting of display monitors with minimal projection from face of wall.

1. Different monitor sizes can be used without changing wall components
2. Monitors will not be enclosed behind glass for ease of accessibility.
3. Shrouds will include a minimum of two internal simplex receptacles for power.
4. Shrouds will allow for internal data terminations.
5. Monitors are not included.

E. End fillers for relocatable wall adjacent to fixed walls and columns shall be similar in construction to solid wall skins and fit into end channel on the abutting wall. End channels and Mini-ends will include a continuous light and sound seal.

F. End fillers may utilize solid skins that are field cut to narrower unit width as indicated on drawings. Cut skins will be manufactured in the same manner and with same materials as all other solid skins.

G. Skins glass frames and corresponding framing elements shall be manufactured in widths as indicated on shop drawings.

H. Solid skins and glass frames shall be mounted to structural frame by engaging an operable mechanical bracket that securely engages the framing components. The mechanical bracket will be designed to ensure that un-engaged brackets are easily identified.

I. The installation and removal of solid skins shall require a special tool to limit accessibility to authorized personnel and to ensure security.

J. Solid skins shall be removable for access to wall cavity to facilitate electrical installation and inspection.

K. Solid skins shall be interchangeable with glass frames of equal sizes, and vice versa.

L. Wall structure to accommodate integral lighting fixtures as provided by the relocatable wall manufacturer.

2.04 STRUCTURAL FRAMING COMPONENTS

A. Structural framing posts will include a threaded leveler for adjusting to floor variations

B. Ceiling track shall be one-piece continuous formed steel with continuous factory-installed resilient light and sound.

C. Primary structural components will be formed of 16 gauge steel.

D. Horizontal and vertical framing components will be joined with 11 gauge corner brackets.

E. Vertical structural framing components shall incorporate integral slotting for direct mounting of panel-hung components on either or both sides of the wall, including side-by-side mounting. Continuous seals will conceal all slots. Structural framing components shall allow for direct mounting of panel-hung furniture without the need for any additive, field installed components. Structural framing can accommodate the direct interface of overhead storage and shelving without the use of any additional adapter/transition brackets.

F. Slotting will allow for wall mounted components to be positioned vertically at 1” increments from 18” to 120” AFF.

G. The system shall allow for installation on hard surface, or carpeted flooring, without the use of mechanical fasteners (in non-seismic applications).

H. The system can be installed to the underside of suspended ceilings without the use of destructive fasteners, with a one-piece continuous steel ceiling track.

I. Structural framing elements will be factory prepared for all connections and joinery hardware, and pre-punched for cable management.

J. Structural posts will be factory punched to optimize all required segmentation configurations, so that posts are interchangeable and share common hole locations.

K. Framing components to include factory applied polypropylene gaskets to serve as light and sound seals between the relocatable wall and fixed architectural elements.

2.05 DOOR COMPONENTS

A. Butt hinge door frames shall be reversible, allowing the installer to change the door swing as part of the installation process.

B. Butt-Hinged door frames shall be formed steel and aluminum and shall include continuous resilient sound seal at side and top jambs. Frame shall be designed to provide vertical adjustment to compensate for floor and ceiling irregularities without the need to cut doors on site. Frames shall be mortised and reinforced for hardware as specified in section 08 71 00.

C. Wall manufacturer to provide offset hinges for planar alignment of door with corridor side of wall.

D. Reversible door frames and door leaves to be capable of receiving automatic door bottoms for improved sound control.

E. Slide Door Units shall include fascia, header and track, finished opening frame, and sliding door. Track Shall be aluminum. Roller assemblies will be steel, with high quality ball bearing wheels. Hardware assembly to include pneumatic braking mechanism.

F. Slide door frames and door leaves to be capable of receiving automatic door bottoms for improved sound control.

G. Slide door track will be fully supported by wall structure, without requiring additional structural support from other architectural elements.

H. Solid door leaves shall be 1-3/4" thick; available in wood particleboard core with factory finished medium density overlay face or veneer. Doors shall be pre-finished and pre-mortised for hardware specified in section 08 71 00.

I. Polished glass doors to be ½" thick tempered glass. Doors shall be prepared and pre-drilled for hardware.

J. Hardware shall be
   1. Furnished and installed by the relocatable wall manufacturer.

K. The following hardware is to be furnished and installed by the relocatable wall contractor:
   1. Steelcase offset hinges for reversible door frame
   2. Slide door track, hardware, door pull and lock

L. Cylinders and cores that are configured to specific master-key requirements will be provided and installed by others

2.06 GLAZED OPENING COMPONENTS

2

A. All glass frames to be flush glazed.

B. Captured glass frame assemblies shall accommodate single glazed or double glazed configurations. Single glazed assemblies shall be capable of retrofit to double glazed, and vice-versa.

C. The structural frame and glass frame configuration will allow for glass frames to be exchanged for solid skins and vice-versa, without having to alter the structural frame components.

D. Captured glass frames shall be pre-glazed prior to arriving at site.

E. All glass framing components will be constructed of extruded aluminum, either powder coat paint and/or clear anodized as called for in finish schedule.

F. All glass and glazing for relocatable walls shall be furnished under this section.

G. All unitized glass shall be factory installed using extruded non-PVC glazing strips. Foam tape or PVC glazing is not acceptable.

H. All glass shall comply with Federal Safety Standard for Architectural Glazing Materials (16 CFR, Part 1201).

I. Glass Types:
   1. Refer to Section 08 80 00, Glazing.

2.07 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Relocatable wall construction shall allow for field installation of modular and/or hard-wired electrical components.

B. If specified, modular power shall be furnished under this section and shall include:
   1. UL 183 4-circuit, 8-wire prefabricated/pre-wired power distribution system.
   2. The modular power system shall be comprised of power blocks, receptacles, power harnesses and infeeds.
   3. Modular power system shall be electrified by using either a floor infeed, top infeed, or power harness.
   4. The modular power block shall provide for the insertion of receptacles of either the same or different circuits.
   5. Modular power components will allow for modular electrical receptacles, such that the circuit assignment for any termination can be easily changed by exchanging modular receptacles.
   6. Modular power receptacles will include an acoustical back-box to minimize sound transmission at power cutouts and terminations.

2.08 LED LIGHTING COMPONENTS

A. LED light fixtures will be provided by the wall manufacturer to supplement general lighting in video conferencing rooms. Refer to plans for locations and switching requirements.

B. Fixtures shall be factory assembled and integrated into the wall structure to be flush to the surface of the wall.

C. Light fixtures will be interchangeable with solid skins of same sizes.

D. Light source to be 24V LED light strip.

E. Lighting to include transformer and LED dimming controller for dimming switch device.

F. Light Output Characteristics:
   1. Correlated Color
   2. Temperature: CCT 3,000 K +/- 250 per ANSI color bin
   3. Color Rendering Index: CRI 80 minimum
   4. Intensity (Surface Brightness): 1250 cd/m2 +/- 350 cd/m2

G. The following components will be provided and installed by others, see Division 26 - Electrical:
   1. Electrical enclosure for transformer & dimming controller
   2. Switches or other control devices and related wiring
   3. Final wiring and connections from light fixture to transformer.
   4. Final wiring and connections to building power source

2.09 MATERIALS

A. All metal painted panel surfaces, glass frames, doorframes, base trim and ceiling track will be cold-formed steel or extruded aluminum.

B. Where noted in drawings, aluminum will be extruded aluminum (6063-T6 Aluminum alloy) with a clear anodized finish.

C. All glass shall comply with Federal Safety Standard for Architectural Glazing Materials (16 CFR, Part 1201).

D. Light and sound seals to be polypropylene.

E. Finishes: Refer to Finish Schedule on Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that building conditions are ready to receive wall components and that field measurement dimensions are as indicated on shop drawings.

B. Verify that floor level does not vary by more than plus/minus ¾" from specified height.

C. Verify that ceiling level does not vary by more than plus/minus ¾" from specified height.

D. Verify that adjacent *surfaces do not exceed 1/8 inch in 8'-0" variation from plumb.*

E. Verify that floor flatness complies with the American Concrete Institute (ACI) floor flatness (FF) requirements per AC117 and ASTM E1155 for Moderately Flat floors (maximum of 3/8" gap over 90% of samples and 5/8" gap over 100%).

3.02 INSTALLATION

A. Walls shall be installed without permanent fastenings over finished floor tile, carpeting or raised floor to provide for complete flexibility of future changes without having to patch floor material (unless required for door/hardware operation, or to meet structural or code requirements).

B. Partition shall be scribed and neatly fitted to existing building conditions all in accordance with details approved on shop drawings

C. Installer to provide touch-up of all nicks and scratches that may occur to the wall during handling and installation with touch up paint supplied by the manufacturer in matching color.

D. Installation shall not commence until building is enclosed and finishing operations, including ceiling, floor-covering and painting, are complete.

3.03 CLEANING

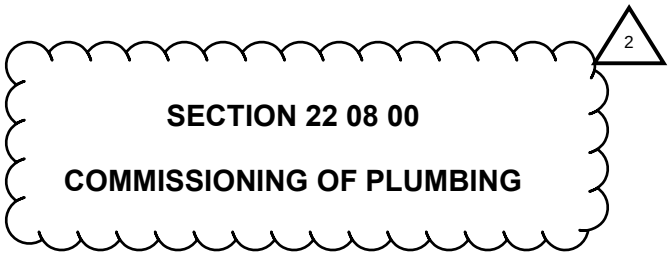
A. Upon completion of work, this contractor shall remove all of his cartons, trash, crates, etc. and leave the premises broom clean.

B. Washdown of walls shall not be part of this section, but shall be considered normal pre-occupancy cleaning responsibility of G.C., owner or occupant.

3.04 MAINTENANCE

A. It shall be the responsibility of the relocatable wall bidder to include in this proposal, the location of the nearest service facility established to service occupant changes of material requirements.

END OF SECTION



PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

A. Section includes commissioning process requirements for the following plumbing systems, assemblies, and equipment:
   1. Domestic hot- and cold-water piping.
   2. Plumbing pumps.
   3. Plumbing equipment.

B. Related Requirements:
   1. Section 019113 "General Commissioning Requirements" for general commissioning process requirements and Commissioning Coordinator responsibilities.

1.03 DEFINITIONS

A. Cx: Commissioning, as defined in Section 019113 "General Commissioning Requirements."

B. CxA: Commissioning Authority, as defined in Section 019113 "General Commissioning Requirements."

C. "Systems," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For plumbing testing technician.

B. Construction Checklists: See related Sections for technical requirements for the following construction checklists:
   1. Vibration and seismic controls for plumbing piping and equipment.
   2. Instrumentation and control for domestic hot water.
   3. Domestic water piping.
   4. Pumps, valves, and accessories.
   5. Water heaters.

C. Test Equipment and Instruments: For all test equipment and instruments to be used in conducting Cx tests by Contractor, provide the following:
   1. Equipment/instrument identification number.
   2. Planned Cx application or use.

3. Manufacturer, make, model, and serial number.
4. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
5. Equipment manufacturers' proprietary instrumentation and tools. For each instrument or tool, identify the following:
    a. Instrument or tool identification number.
    b. Equipment schedule designation of equipment for which the instrument or tool is required.
    c. Manufacturer, make, model, and serial number.
    d. Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

1.05 QUALITY ASSURANCE

A. Plumbing Testing Technician Qualifications: Technicians to perform plumbing construction checklist verification tests, construction checklist verification test demonstrations, commissioning tests, and commissioning test demonstrations shall have the following minimum qualifications:
    1. Journey level or equivalent skill level with knowledge of plumbing system, electrical concepts, and building operations.
    2. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.

B. Testing Equipment and Instrumentation Quality and Calibration: For test equipment and instrumentation required to perform plumbing commissioning work, perform the following:
    1. Capable of testing and measuring performance within the specified acceptance criteria.
    2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
    3. Be maintained in good repair and operating condition throughout duration of use on Project.
    4. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.

C. Proprietary Test Instrumentation and Tools:
    1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the commissioning process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, perform the following:
        a. Be calibrated by manufacturer with current calibration tags permanently affixed.
        b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
        c. Plumbing system proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL TESTING REQUIREMENTS

A. Certify that plumbing systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents and approved Shop Drawings and submittals.

B. Certify that plumbing instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved Shop Drawings and submittals, and that pretest set points have been recorded.

C. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

D. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions to verify compliance with acceptance criteria.

E. Test systems, assemblies, subsystems, equipment, and components operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and response according to acceptance criteria.

F. Construction Checklists: Prepare and submit detailed construction checklists for plumbing systems, subsystems, equipment, and components.
   1. Contributors to the development of construction checklists shall include, but are not limited to, the following:
      a. Plumbing systems and equipment installers.
      b. Plumbing instrumentation and controls installers.

G. Perform tests using design conditions, whenever possible.
   1. Simulated conditions may, with approval of Architect, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by Commissioning Coordinator and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
   2. Commissioning test procedures may direct that set points be altered when simulating conditions is impractical.
   3. Commissioning test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.

H. If tests cannot be completed because of a deficiency outside the scope of the plumbing system, document the deficiency and report it to Owner. After deficiencies are resolved, reschedule tests.

I. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.

J. Coordinate schedule with, and perform the following activities at the direction of, Commissioning Coordinator.

K. Comply with construction checklist requirements, including material verification, installation checks, start-up, and performance tests requirements specified in Sections specifying plumbing systems and equipment.

L. Provide technicians, instrumentation, tools, and equipment to complete and document the following:
   1. Performance tests.
   2. Demonstration of a sample of performance tests.
   3. Commissioning tests.
   4. Commissioning test demonstrations.

END OF SECTION

SECTION 22 11 23

DOMESTIC WATER PUMPS

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. In-line, sealless centrifugal pumps.

1.03 DEFINITIONS

A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include materials of construction, rated capacities, certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. LEED Submittals:
   1. Product Data for Prerequisite EA 2: Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, without amendments, Section 7 - "Service Water Heating."

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water pumps to include in operation and maintenance manuals.

1.06 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. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with pump manufacturer's written rigging instructions for handling.

1.08 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.01 IN-LINE, SEALLESS CENTRIFUGAL PUMPS

A. Manufacturers: Subject to compliance with requirements, products by one of the following:
1. Armstrong Pumps, Inc.
2. Bell & Gossett; a Xylem brand.
3. Grundfos Pumps Corp. (Model No. UPS-26-99-BUAC/T)

2

B. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps.

C. Pump Construction:
1. Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal.
2. Casing: Bronze, with threaded or companion-flange connections.
3. Impeller: Corrosion-resistant, Composite, PES.
4. Motor: Integrated Variable Speed Drive.

D. Capacities and Characteristics:
1. Capacity: Refer to drawings. Built-in timer.

2.02 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 22 05 13 "Common Motor Requirements for Plumbing 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.

2.03 CONTROLS

A. Aquastat: Field adjustable for control of hot water circulating pump.
1. Description: Thermostatic switch.
2. Type: Bi-metallic disc, snap acting.
3. Enclosure: Environmentally sealed.
4. Mounting: Clip-on mount for ¾" copper tube.
5. Similar to Grundfos No. 595657.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in of domestic-water-piping system to verify actual locations of connections before pump installation.

3.02 PUMP INSTALLATION

A. Comply with HI 1.4.

B. Install in-line, sealless centrifugal pumps with shaft horizontal unless otherwise indicated.

C. Install horizontal mounted, in-line, separately-coupled and close-coupled centrifugal pumps with shaft(s) horizontal.

D. Pump Mounting: Install vertically mounted, in-line, close-coupled centrifugal pumps with cast-iron base mounted on concrete base using elastomeric pads restrained spring isolators.
   1. 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.
   2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
   3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   4. Install anchor bolts to elevations required for proper attachment to supported equipment.
   5. Comply with requirements for hangers and supports specified in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."

E. Install thermostats in hot-water return piping.

3.03 CONNECTIONS

A. Comply with requirements for piping specified in Section 22 11 16 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to pumps to allow service and maintenance.

C. Connect domestic water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.
   1. Install flexible connectors adjacent to pumps in suction and discharge piping of the following pumps:
      a. Horizontal mounted, in-line, close-coupled centrifugal pumps.
      b. Comply with requirements for flexible connectors specified in Section 22 11 16 "Domestic Water Piping."

D. Install shutoff valve and strainer on suction side of each pump, and check, shutoff, and throttling valves on discharge side of each pump. Install valves same size as

connected piping. Comply with requirements for valves specified in Section 22 05 23.12 "Ball Valves for Plumbing Piping," Section 22 05 23.13 "Butterfly Valves for Plumbing Piping," Section 22 05 23.14 "Check Valves for Plumbing Piping," and Section 22 05 23.15 "Gate Valves for Plumbing Piping," and comply with requirements for strainers specified in Section 22 11 19 "Domestic Water Piping Specialties."

1. Install pressure gage and snubber at suction of each pump and pressure gage and snubber at discharge of each pump. Install at integral pressure-gage tappings where provided or install pressure-gage connectors in suction and discharge piping around pumps. Comply with requirements for pressure gages and snubbers specified in Section 22 05 19 "Meters and Gages for Plumbing Piping."

E. Connect aquastat to hot water return pumps that they control.

3.04 IDENTIFICATION

A. Comply with requirements for identification specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment" for identification of pumps.

3.05 STARTUP SERVICE

A. Perform startup service.
1. Complete installation and startup checks according to manufacturer's written instructions.
2. Check piping connections for tightness.
3. Clean strainers on suction piping.
4. Set aquastat and timer for automatic starting and stopping operation of hot water return pumps.
5. Perform the following startup checks for each pump before starting:
   a. Verify bearing lubrication.
   b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
   c. Verify that pump is rotating in the correct direction.
6. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
7. Start motor.
8. Open discharge valve slowly.
9. Adjust temperature settings on thermostats.
10. Adjust timer settings.

3.06 ADJUSTING

A. Adjust domestic water pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust initial temperature set points.

C. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION

SECTION 23 31 13

HVAC METAL DUCTS

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. Ducts and fittings.
2. Sheet metal materials.
3. Flexible Ducts.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.
7. Seismic-restraint devices.
8. Duct leakage testing.

B. Related Sections:
1. Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 23 07 13 “HVAC Duct Insulation”.
3. Section 23 33 00 "Air Duct Accessories" for dampers, duct silencers, duct-mounting access doors and panels, turning vanes, and flexible connections.
4. Section 23 31 19 "HVAC Casings" for factory- and field-fabricated casings for mechanical equipment.

1.03 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design:
1. Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
2. Contractor may change duct sizes from those shown provided pressure drop and velocity remain constant. Duct aspect ratio shall be maximum 3:1 unless approved by owner’s representative.

B. 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", ASCE/SEI 7, and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
   1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
   2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
   3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of the following products:
   1. Flexible ducts.
   2. Liners and adhesives.
   3. Sealants and gaskets.
   4. [[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 details and spacing.
   8. Seam and joint construction and sealing.
   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, flexible connectors, and access doors and panels.
   12. Hangers and supports, including methods for duct and building attachment and vibration isolation.

C. Delegated-Design Submittal:
   1. Sheet metal thicknesses.
   2. Joint and seam construction and sealing.
   3. Reinforcement details and spacing.
   4. Materials, fabrication, assembly, and spacing of hangers and supports.
   5. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation] for selecting hangers and supports [and seismic restraints].

D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK) – HVAC Air Duct Leakage Test Manual.

1.05 INFORMATIONAL SUBMITTALS

A. Welding certificates.
B. Field quality-control reports.

1.06 QUALITY ASSURANCE

A. 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 D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
   3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
D. REGULATORY REQUIREMENTS
   1. Construct ductwork to NFPA 90A standards.

E. FIELD CONDITIONS
   1. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
   2. Maintain temperatures within acceptable range during and after installation of duct sealants.
   3. Ductwork shall be transported to the site in enclosed vehicles or with ends capped.
   4. Do not store ductwork directly on ground or floor.
   5. Ductwork stored or stacked on site shall be capped.
   6. Installed duct shall be capped at the end of the day. Duct found uncapped after the end of the day shall be cleaned.

PART 2 - PRODUCTS

2.01 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.
   1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
   2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Transverse Joints: Prefabricated slide on joints or formed-on flanges fabricated according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," 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."

a. Slide on Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.

b. Formed on Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.

2. Manufacturers
   a. Ductmate Industries, Inc.
   b. Lockformer.
   c. Nexus Inc.
   d. Ward Industries

C. Longitudinal Seams: Pittsburgh lock seams fabricated according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," 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.
   2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

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."

E. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359-inch thick or less, with more than 10 sq ft of non-braced panel area unless ducts are lined.

2.02 SINGLE-WALL ROUNDDUCTS 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.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. 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."

D. Duct Joints
   1. Ducts up to 20 Inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.
   2. Ducts 21 to 60 Inches in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.
   3. Ducts Larger than 60 Inches in Diameter: Companion angle flanged joints per SMACNA "HVAC Duct Construction Standards--Metal and Flexible," Figure 3-2.
   4. Round Ducts: Prefabricated connection system consisting of double-lipped, EPDM rub-ber gasket. Manufacture ducts according to connection system manufacturer's tolerances.
      a. Manufacturers
         1) Ductmate Industries, Inc.
         2) Lindab Inc.

E. 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 less than 84 inches diameter with spiral lockseam.
   2. Fabricate round ducts larger than 84 inches in diameter with butt-welded longitudinal seams.
   3. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

F. 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." 90 degree T’s without shoe and pulled fittings are not permitted.

G. Fabricate elbows using die-formed, gored spot welded and sealed, or pleated construction. Unless elbow construction type is indicated, fabricate elbows as follows:
   1. Round Elbows 8 Inches and Less in Diameter: 2-piece welded construction, fabricate die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate non-standard bend-angle configurations or nonstandard diameter elbows with gored construction.
   2. Round Elbows 9 through 14 Inches in Diameter: Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees. Fabricate non-standard bend-angle configurations or nonstandard diameter elbows with gored construction.
   3. Round Elbows Larger than 14 Inches in Diameter and All Flat-Oval Elbows: Fabricate gored elbows.

2.03 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 (except as noted below): G60 (Z180).
   2. Galvanized Coating Designation for outside air intake ductwork, outdoor unjacketed ductwork, and as otherwise noted: G90 (Z275).
   3. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. PVC-Coated, Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
   1. Galvanized Coating Designation: G60 (Z180).
   2. Minimum Thickness for Factory-Applied PVC Coating: 4 mils (0.10 mm) thick on sheet metal surface of ducts and fittings exposed to corrosive conditions, and minimum 1 mil (0.025 mm) thick on opposite surface].
   3. Coating Materials: Acceptable to authorities having jurisdiction for use on ducts listed and labeled by an NRTL for compliance with UL 181, Class 1.

D. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

E. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M) Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

F. Factory- or Shop-Applied Antimicrobial Coating:
   1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.
   2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
   3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested according to ASTM D 3363.
   4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
   5. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.

G. 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.

H. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

I. Duct Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during transportation and construction.
   1. Product: DynAir Duct Protection Film or equivalent.
   2. High tack water-based adhesive.
   3. Thickness: 2 mils.
   4. UV stability.
   5. VOC content: zero.
   6. Elongation before break: minimum 325 %.

2.04 DUCT LINER

A. General Requirements:
   1. No fiberglass duct liner is allowed.
   2. Service temperature: -20 deg F to 250 deg F.
   3. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
   4. NFPA 90A and NFPA 90B compliant.
   5. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
   6. Passes ASTM C665 and C1338 for fungi resistance and mold growth.

B. Polyester Duct Liner:
   1. Manufacturers:
      a. Ductmate - PolyArmor.
      b. Or engineer-approved equivalent.
   2. K value: ASTM C518, 0.24 at 75 deg F; R-value per inch: 4.2.
   3. Minimum Noise Reduction Coefficient (NRC): 0.65 at 1 inch thickness.
   4. Maximum moisture sorption: 2% by weight.
   5. Minimum 25% recycled content.
   6. Volatile Organic Content (VOC): 0 ppm.
   7. Water-Based Liner Adhesive.

C. Polyamide Foam Duct Liner:
   1. Manufacturers:
      a. Boyd Corporation – Solcoustic.
      b. Or engineer-approved equivalent.
   2. K value: ASTM C518, 0.30 at 75 deg F; R-value per inch: 3.3.
   3. Minimum Noise Reduction Coefficient (NRC): 0.70 at 1 inch thickness.
   4. Maximum moisture sorption: 2% by weight.
   5. Mechanical Fasteners:
      a. Suitable for attachment to duct without damaging liner as recommended by manufacturer.
      b. Pin length: as required. Pin shall project no more than 1/8 inch (3 mm) into air stream.

D. 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- (2.6-mm-) diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

2.05 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 (ASTM E84); certified by an NRTL.
B. Water-Based Joint and Seam Sealant:
   1. Application Method: Brush on or spray on.
   2. Solids Content: Minimum 65 percent.
   3. Shore A Hardness: Minimum 20.
   4. Water resistant.
   5. Mold and mildew resistant.
   6. Volatile Organic Content (VOC): Maximum 75 g/L (less water).
   7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
   8. Service: Indoor or outdoor.
   9. Substrate: Compatible with galvanized sheet steel, stainless steel, or aluminum sheets.

C. Flanged Joint Sealant: Single-component, acid-curing, silicone, elastomeric. Comply with ASTM C 920, Type S, Grade NS, Class 25, Use O.
   1. 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).
   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."

D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

E. 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 for10-inch wg static-pressure class, positive or negative.

2.06 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
F. 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.
G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:
1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.07 SEISMIC-RESTRAINT DEVICES

A. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
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.

B. 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.
C. 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.
1. Basis of Design: Mason SCB.

D. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
E. 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

3.01 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 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 at least 1 inch (25 mm), 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 (38 mm).
K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 23 33 00 "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."
M. Under no circumstances will any labels be permitted on interior surfaces of ductwork. Any materials delivered to the jobsite with interior labels shall be physically and chemically cleaned to remove all remnants of the tag and/or adhesive used to place it.
N. Where connecting flexible duct to metal duct the inner lining shall be placed a minimum of 6 inches over the metal. A zip tie shall be placed over the joint and the flexible duct collar attached with a minimum of three sheet metal screws with foil tape provided to seal the end. The duct insulation shall cover this assembly with the outer membrane covering the insulation and sealed with tape having an integral vapor barrier.
O. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
P. Duct Tape is not permitted.
Q. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
R. Aluminum ductwork shall be used to handle moisture-laden air from shower rooms, shower drying rooms. Slope duct up at minimum 1% slope away from exhaust grille for minimum of 10 feet.
S. At exterior wall louvers, seal duct to louver frame. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Insulate unused portion of outside air intake or exhaust louvers, and duct to the insulated isolation damper. Blank-out material shall be same material as duct, painted black on exterior side. Install outside air intakes to pitch (1 inch per 20 feet) toward intake louver where possible, provide a low point drain prior to equipment where intake duct must slope down from louver. Seal ducts seams to form watertight joints.

T. Install minimum 10 feet of stainless steel duct after all duct mounted humidifiers with botoom surface sloped back at 1% to humidifier.

3.02 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts 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. Comply with ASTM A780.

3.03 ADDITIONAL EXTERIOR DUCT INSTALLATION REQUIREMENTS

A. Exterior ductwork under negative pressure shall be so designed and constructed that rainwater on the duct surface cannot be drawn into the duct to reappear inside the building.

B. Exterior ductwork under positive pressure is to be made watertight with exterior waterproof sealant.

C. The cross section of all exterior ductwork shall be pitched at 1 percent slope such that water drains from the top of the duct to one or both sides of the duct, and does not pool on the top.

D. Paint exposed roof mounted ductwork; color to be per Architect requirements.

3.04 ADDITIONAL WELDED DUCT REQUIREMENTS

A. All welded duct may be butt-welded or joggle welded. Where joggle welds are used on fume exhaust systems, the lip formed on the interior surface shall be oriented downstream of the airflow to minimize pockets where condensed liquids may collect.
B. Welded duct sections shall be verified to be continuous and free of leakage prior to shipment from the fabrication facility. Leakage testing may be accomplished utilizing either light or pressurization.
C. Welds on exposed ductwork in occupied spaces shall be prepared as follows:
   1. Stainless Steel #2B: Standard stainless steel finish used for ductwork, exhaust stacks, within mechanical spaces, low wall returns, fume hoods, back of house systems, etc. Welds shall be brushed and painted with Chrome Aluminum paint.

2. Stainless Steel #4: Exposed aesthetic architectural finish. Only shall be used when specified on drawings or elsewhere in the specifications. Finish shall be prepared to a kitchen grade finish with welds ground smooth and brush polished to restore the #4 finish.

D. For installations serving fume exhaust.
1. All fittings shall be long radius. Round elbows shall be minimum 5 gore.
2. Slope horizontal ductwork back toward source connected equipment minimum 1% slope so that moisture and liquids may drain back toward equipment.
3. Low point “traps” in the ductwork shall be fitted with a low point drain valve, ½” welded connection, stainless steel piping and valve.

3.05 ADDITIONAL REQUIREMENTS FOR CLOTHES DRYER EXHAUST DUCT

A. Duct shall not be routed through plenum or unconditioned attic or crawlspace.

B. Flexible dryer duct shall not be concealed.

3.06 ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL KITCHEN HOOD EXHAUST DUCT

A. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood for horizontal runs less than 75 feet. Duct shall be sloped at 1-inch per 12 inches for horizontal runs in excess of

B. Install fire-rated access panel assemblies at each change in direction and at maximum intervals of, 20 feet (6 m) where installed access doors are 20 inches x 20 inches and 12 feet (3.7 m) where access doors are less than 20 inches x 20 inches, in horizontal ducts, and at every floor for vertical ducts, or as indicated on Drawings.

C. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.
D. Install residue trap at the base of each vertical riser.

3.07 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."

3.08 INTERNAL LINING IINSTALLATION

A. 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.

3.09 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 (Table 5-1M), "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.

3.10 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." ASCE/SEI 7.
   1. Space lateral supports a maximum of 40 feet on.center, and longitudinal supports a maximum of 80 feet on center.
   2. Brace a change of direction longer than 12 feet.

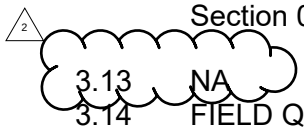
B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
C. Install cables so they do not bend across edges of adjacent equipment or building structure.
D. Install cable restraints on ducts that are suspended with vibration isolators.
E. Install seismic-restraint devices using methods approved by the Office of Statewide Health Planning and Development for the State of California or an agency acceptable to authorities having jurisdiction.
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.

3.11 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 23 33 00 "Air Duct Accessories."
B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.12 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 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting.".



3.13 NA

3.14 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 of positive 3-Inch wg or higher or negative 3-Inch wg or lower: Test 100 percent of total installed duct area for each designated pressure class.
      b. Ducts with a Pressure Class between positive 2-Inch wg and negative 2-Inch wg inclusive: Test representative duct sections, selected by Design Engineer, totaling no less than 25 percent of total installed duct area for each designated pressure class.
      c. Risers and all supply and exhaust branch ducting shall be tested to within 5 feet of a diffuser collar or the point of connection to an exhaust device, respectively.
      d. Welded Exhaust Ducts: Test 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.

3.15 DUCT SCHEDULE

A. Fabricate ducts of galvanized steel except as otherwise indicated and as follows:

Table: Duct Schedule

Type	Material	Pressure Class	Rect. Leakage Class	Round Leakage Class	Seal Class
Supply Risers/Mains	Galvanized	+ 4" w.g.	6	3	A
Supply (after fan coil units, heat pumps)	Galvanized	+ 2" w.g.	24	12	C
Constant volume AHU Supply (Risers and Mains)	Galvanized	+ 3" w.g.	6	3	A
Return	Galvanized	- 2” w.g.	24	12	C
Transfer	Galvanized	- 1” w.g.	24	12	C
Outside Air	Galvanized	- 2” w.g.	24	12	C
General Exhaust	Galvanized	- 2" w.g.	12	6	B

Notes:

1. All supply, return, relief and exhaust duct utilized as part of a smoke exhaust, stair and elevator pressurization system pressure class shall be 1.5 times that stated above or maximum scheduled fan design pressure whichever is greater.

B. Liner:
   1. Supply Air Ducts: Polyester, 1 inch (25 mm) thick.
   2. Return Air Ducts: Polyester, 1 inch (25 mm) thick.
   3. Exhaust Air Ducts: Polyamide, 1 inch (25 mm) thick.
   4. Supply Fan Plenums: Polyamide, 2 inches (51 mm) thick.
   5. Return- and Exhaust-Fan Plenums: Polyamide, 2 inches (51 mm) thick.
   6. Transfer Ducts: Polyamide, 1 inch (25 mm) thick.

C. 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 (5 m/s) 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 (5 to 7.6 m/s):
   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 (7.6 m/s) 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.
   b. Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
   c. Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
   d. Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
   e. Radius-to Diameter Ratio: 1.5.
   f. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
   g. Round Elbows,14 Inches and Larger in Diameter: Standing seam.

D. 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

SECTION 23 33 00

HVAC DUCT ACCESSORIES

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. Backdraft dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Pressure Independent Automatic Balancing Dampers
5. Fire dampers.
6. Smoke dampers.
7. Combination fire and smoke dampers.
8. Corridor dampers.
9. Duct silencers.
10. Turning vanes.
11. Remote damper operators.
12. Duct-mounted access doors.
13. Flexible connectors.
14. Duct security bars.
15. Duct accessory hardware.

B. Related Requirements:
1. Division 07 for Firestopping.
2. Section 23 31 13 “HVAC Metal Ducts” for flexible ducts.
3. Division 26 for wiring connections.

1.03 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.

2

B. REMOVED.

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.

1.04 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.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.06 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. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

1.07 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
B. Sound Attenuators
1. All tests shall be conducted by a laboratory that is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) to conduct the test. A copy of the accreditation certificate must be included with the submittals. Data from non-NVLAP accredited test facilities will not be accepted. Where test data is obtained in the manufacturer's laboratory, the facility shall be available for inspection and witnessed testing by the architect, mechanical engineer and acoustical consultant in order to verify compliance with the latest edition of ASTM Standard E477 or a test standard approved by the acoustical consultant. The architect or project acoustical consultant shall be the final arbiter in determining compliance.
2. Manufacturer’s Experience: The manufacturer shall have successful experience in duct silencer production, including no less than five years experience in fabrication and delivery of duct silencers equal in size and quantity to this work. The Manufacturer shall be capable of supplying references and acoustical test results for up to five recently completed projects similar to this work.
3. Acoustical and Aerodynamic Performance: Duct silencer acoustical and aerodynamic performance shall be determined in accordance with the latest edition of ASTM Standard E477-90 Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers or a test standard

approved by the acoustical consultant. All silencer ratings shall be determined in a duct-to-reverberant room test facility that provides for airflow in both directions through the test silencer in accordance with the latest edition of ASTM E-477 test standard or a test standard approved by the acoustical consultant. The test set-up, procedure and facility shall eliminate all effects due to flanking, directivity, end reflection, standing waves and reverberation room absorption.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

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.

C. Provide duct accessories of materials suited to associated duct materials.

D. Air extractors shall not be used, except with the expressed written consent of the Design Engineer.

2.02 BACKDRAFT DAMPERS

A. General:
1. Provide manufacturer’s standard backdraft damper if available as fan or air-moving equipment accessory.
2. Provide damper material of the same material as associated ductwork.

B. Manufacturers:
1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.

C. Description: Gravity balanced.
1. Maximum Air Velocity: 3000 fpm.
2. Maximum System Pressure: match associated ductwork.
3. Frame: hat shaped, minimum 20 gage galvanized steel,flanged both sides.
4. Bearings: Synthetic.
5. Blades: Multiple single-piece parallel blades, minimum 28 gage galvanized steel.
6. Blade Seals: Extruded vinyl, mechanically locked.
7. Linkage: concealed in frame
8. Blade Axles:
    a. Up to 42 inch damper width: Nonmetallic or steel
    b. 42 inch width and larger: steel.
9. Tie Bars and Brackets: Galvanized steel.
10. Accessories:
    a. Adjustment device to permit setting for varying differential static pressure.
    b. Counterweights and spring-assist kits for vertical airflo

c. Electric actuators.
d. Chain pulls.
e. Screen Mounting: Front mounted in sleeve.
   1) Sleeve Thickness: 20 gage minimum.
   2) Sleeve Length: 6 inches minimum.
f. Screen Mounting: Rear mounted.
g. Screen Material: Galvanized steel.
h. Screen Type: **Bird**.
i. 90-degree stops.

2.03 BAROMETRIC RELIEF DAMPERS

A. Description: Counterbalanced backdraft damper.
1. Sensitivity: 0.01 inch w.g. differential pressure.
2. Frame : extruded aluminum channel, front and rear flanges.
3. Blades: Single-piece, parallel, minimum 28 gage aluminum
4. Blade Seals: Extruded vinyl, mechanically locked maximum 6” width.
5. Bearings: Synthetic
6. Counterbalance: zinc plated adjustable steel weights attached to blades.
7. Accessories:
   a. Screen Mounting: Front mounted in sleeve.
      1) Sleeve Thickness: 20 gage minimum.
      2) Sleeve Length: 6 inches minimum.
   b. Screen Mounting: Rear mounted.
   c. Screen Material: Galvanized steel.
   d. Screen Type: **Bird**.

2.04 MANUAL VOLUME DAMPERS

A. General Description: Factory fabricated, with required hardware and accessories.

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

C. Damper Frame: hat-shaped, material shall match associated ductwork.

D. Flanges for attaching to walls and flangeless frames for installing in ducts.

E. Manufacturers:
1. Ruskin.
2. Louvers and Dampers.
3. Nailor Industries.

F. Standard Manual Volume Dampers (2-inch wg and below):
1. Frame: 3 inch deep, minimum 20 gauge galvanized steel.
2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Maximum Air Velocity: 1500 fpm.
5. Maximum System Pressure: 2 inch w.g.
6. Axles:

a. 18” wide and below: minimum 3/8” square extended beyond frame with standoff bracket.
b. 19” wide and above: minimum 1/2” square extended beyond frame with standoff bracket.
c.

7. Blades:
   a. Stiffened, opposed-blade design.
   b. 18” wide and below: 22 gauge.
   c. 19” wide and above: 16 gauge.
   d. [Include locking hand quadrant to hold single-blade dampers in a fixed position without vibration.]
8. Bearings: Molded synthetic.

G. Standard Manual Volume Dampers 3-inch wg and above):
1. Frame: 5-inch deep, minimum 16 gage reinforced for corner braces.
2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Maximum Air Velocity: 1500 fpm.
5. Maximum System Pressure: 5 inch w.g.
6. Axles: minimum 1/2”
7. Control shaft: minimum 1/2” square extended beyond frame with standoff bracket, with outboard support bearing.
8. Blades:
   a. Opposed-blade design.
   b. Minimum 16 gage
   c. Stiffen damper blades for stability.
   d. Blade stop.
   e. [Include locking hand quadrant to hold single-blade dampers in a fixed position without vibration.]
9. Bearings: Molded synthetic.

H. Low-Leakage, Steel, Manual Volume Dampers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Pottorff.
   b. Ruskin Company.
   c. Trox USA Inc.
2. Comply with AMCA 500-D testing for damper rating.
3. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
4. Suitable for horizontal or vertical applications.
5. Frames:
   a. Hat or U shaped.
   b. 0.094-inch- (2.4-mm-) thick, galvanized sheet steel.
   c. Mitered and welded corners.
   d. Flanges for attaching to walls and flangeless frames for installing in ducts.
6. Blades:
   a. Multiple or single Airfoil blade.
   b. Opposed-blade design.
   c. Stiffen damper blades for stability.
   d. Galvanized, roll-formed steel, 0.064 inch thick.

7. Blade Axles: Galvanized steel.
8. 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.
9. Blade Seals: Neoprene.
10. Jamb Seals: Cambered stainless steel.
11. Tie Bars and Brackets: Galvanized steel.
12. Accessories:
    a. Include locking device to hold single-blade dampers in a fixed position without vibration.

2.05 FIRE AND SMOKE DAMPERS

A. Manufacturers:
1. Ruskin Company.
2. Louvers & Dampers, Inc.
3. Nailor Industries, Inc.
4. Ward Industries.

B. General Requirements:
1. Labeled according to UL 555C by an NRTL.
2. Fabricate in accordance with NFPA 90A
3. Comply with construction details for tested assemblies as indicated in UL's "Fire Resistance Directory."
4. Fire Rating: to suit wall, floor, ceiling, or corridor assembly, refer to Architectural Drawings.
5. Operational ratings: suited to meet duct pressure and velocity design airflow conditions.
6.

C. Fire Dampers:
1. Type: Dynamic.
2. Operational ratings: suited to meet design airflow conditions, and minimum 4-inch wg static pressure class and 2000-fpm velocity.
3. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, galvanized steel; with mitered and interlocking corners.
4. Blades: Roll-formed, interlocking, airfoil, galvanized sheet steel.
5. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
6. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.
7. links.

D. Smoke Dampers:
1. Smoke Detector: . Refer to Specification section 28 31 11 “DIGITAL ADDRESSABLE FIRE ALARM”
2.]Operational ratings: suited to meet design airflow conditions, and minimum 4-inch wg static pressure class and 2000-fpm velocity.
3. Frame: hat shaped, galvanized sheet steel with mounting frame.
4. Blades: Airfoil, galvanized sheet steel.
5. Leakage: Class I.

6. Actuator: electric, out of airstream, two-position, fail closed.
7. Mounting Sleeve: Factory-installed, with breakaway connection galvanized sheet steel; length to suit wall or floor application. Gage shall be per requirements of UL 555 and not less than the attached duct gage, with factory-furnished silicone calking
   The following options are not required by code however, they do provide functionality for the mandatory cycle testing of dampers as required by NFPA. The switch package allows for remote operation and visual indication of the damper status and is typically mounted under the ceiling. Typically this would only be used in industrial applications because of the visual impact of the lights and panel. The damper test switch is typically duct mounted and performs same function to locally cycle test the damper. We should include one of these options unless building contains full smoke control with firemans control panel as all dampers can be tested through that.
8. Switch Package to allow remote indication of damper blade position.
9. Damper test switch for cycle testing.
10. [Auxilary switch for fan signaling for fan shut down where failure of damper would block greater than than 50% of fan airflow.

E. Combination Fire and Smoke Dampers:
1. Operational ratings: suited to meet design airflow conditions, and minimum 4-inch wg (1 kPa) static pressure class and 2000-fpm (10 m/s) velocity.
2. Frame: hat shaped, galvanized sheet steel.
3. Heat-Responsive Device: Electric resettable link and switch package, factory installed, rated.
4. Smoke Detector: **Refer to Specification section 28 31 11 "DIGITAL ADDRESSABLE FIRE ALARM"**Blades: Roll-formed, one-piece airfoil, galvanized sheet steel.
5. Actuator: electric, out of airstream, two-position, fail closed.
6. Leakage: Class I.
7. Mounting Sleeve: Factory-installed, with breakaway connection galvanized sheet steel; length to suit wall or floor application. Gage shall be per requirements of UL 555 and not less than the attached duct gage, with factory-furnished silicone calking.
8. Damper test switch for cycle testing.
9. Auxilary switch for fan signaling for fan shut down where failure of damper would block greater than than 50% of fan airflow.

F. Corridor Dampers:
1. Operational ratings: suited to meet design airflow conditions, and minimum 4-inch wg static pressure class and 2000-fpm velocity.
2. Frame: hat shaped, galvanized sheet steel.
3. Heat-Responsive Device: Electric resettable link and switch package, factory installed, rated.
4. Smoke Detector: **Refer to Specification section 28 31 11 "DIGITAL ADDRESSABLE FIRE ALARM"**Blades: Roll-formed, one-piece airfoil, galvanized sheet steel.
5. Mounting Sleeve: Factory-installed, with breakaway connection galvanized sheet steel; length to suit wall or floor application. Gage shall be per requirements of UL 555 and not less than the attached duct gage, with factory-furnished silicone calking.
6. Leakage: Class I.

2.06 DUCT SILENCERS

A. Manufacturers:
1. Vibro-Acoustics.
2. Ruskin.
3. Kinetics Noise Control.

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.
4. All casing seams and joints shall be lock-formed and sealed or stitch welded and sealed to provide leakage-resistant construction. Airtight construction shall be achieved by use of a duct-sealing compound supplied and installed by the contractor at the jobsite.

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.
6. Rectangular Packless

D. Rectangular Silencer Outer Casing: ASTM A 653/A 653M, G90 (Z275), galvanized sheet steel,
1. Sheet Metal Thickness for straight units 0.034 inch thick.
2. Sheet Metal Thickness for elbow units 0.060 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 (0.85 mm) 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 (Z275) galvanized sheet metal
1. Sheet Metal Thickness for straight units 0.018 inch thick
2. Sheet Metal Thickness for elbow units 0.030 inch thick.
3. Sheet Metal Thickness for circular units through 18 inches 0.018 inch thick
4. Sheet Metal Thickness for circular units above 18 inches 0.030 inch thick

G. Special Construction:
1. Suitable for outdoor use.
2. High transmission loss walls

H. Connection Sizes: Provide transition to and from connecting ductwork to schedule silencer size.

I. Principal Sound-Absorbing Mechanism:
1. Controlled impedance membranes and broadly tuned resonators without absorptive media.
2. Dissipative 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.
    c. Glass fiber and fiber glass will not be permitted.

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.

L. Source Quality Control: Test according to ASTM E 477.

2.07 TURNING VANES

A. Manufacturers:
1. Duro Dyne Inc.
2. Ductmate Industries.
3. Metalaire.
4. Ruskin.

B. 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."

C. 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. Single Wall: 3/4 inch trailing edge and 2 inch radius.
2. Double Wall: 2 inch inside radius. Vane length not to exceed 36 inch.
3. Acoustic Turning Vanes: 4 inch double wall airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

E. 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.

2.08 REMOTE CABLE-DRIVEN VOLUME DAMPER OPERATORS

A. Manufacturers:
1. Pottorff.
2. Ventfabrics, Inc.
3. Ventlok.
4. Young Regulator Company.

B. Description: Cable system designed for remote manual damper adjustment.
1. Provide package for complete workable system for remote damper operation.
2. Pressure Rating: 1-inch w.g.
3. Velocity Rating: 1,500 FPM.
4. Tubing: Plastic.
5. Cable: Stainless steel, 50 feet maximum length.
6. Wall-Box Mounting:
    a. Recessed, with tamper-proof, stainless steel cover plate.

2.09 DUCT-MOUNTED ACCESS DOORS

A. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2 (7-2M), "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."
1. Door:
    a. Double wall; insulation fill and thickness as indicated for duct pressure class, minimum 1 inch.
    b. Hinges and Latches: continuous piano hinge and cam latches.
    c. Shape and material to match ductwork.
    d. Fabricate doors airtight and suitable for duct pressure class.
    e. Doors shall open against air pressure.
    f. On access doors on ducts of 4 inch w.g. pressure or greater, provide sign reading “CAUTION – DOOR CLOSES WITH AIR PRESSURE”.
2. Frame duct opening with continuous 1 inch by 1 inch angle. Provide sponge rubber or neoprene gasket at door-to-frame and frame-to-duct.

B. Pressure Relief Access Door:
1. Door and Frame Material: Galvanized sheet steel.
2. Door: Single wall for non-insulated ducts [**Double wall with insulation fill**] for insulated ducts 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 at 1.0- to 5.0-inch wg.
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- (25-mm-) thick, polystyrene-foam board.

2.10 DUCT ACCESS PANEL ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. 3M.
2. CL WARD & Family Inc.
3. Ductmate Industries, Inc.
4. Flame Gard, Inc.

B. Labeled according to UL 1978 by an NRTL.

C. Panel and Frame: Minimum thickness 0.0528-inch carbon steel.

D. Fasteners: Stainless 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.

2.11 FLEXIBLE DUCTS

A. Noninsulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire.
   1. Manufacturers:
      a. Casco L-181M.
      b. Flexmaster USA 1NI.
      c. Thermaflex MC.
   2. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg negative.
   3. Maximum Air Velocity: 4000 fpm .
   4. Temperature Range: Minus 10 to plus 160 deg F .
   5. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
   6. NFPA 90A and NFPA 90B compliant.

B. Acoustically Rated, Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; vapor-barrier film.
   1. Manufacturers:
      a. Casco SF-181M.
      b. Flexmaster USA 1B.
      c. Thermaflex M-KE.
   2. Pressure Rating: 4-inch wg positive and 0.5-inch wg negative.
   3. Maximum Air Velocity: 4000 fpm .
   4. Temperature Range: Minus 20 to plus 175 deg F.
   5. Water Vapor Permeance: maximum 0.17 perms (ASTM E 96, Procedure A).
   6. Insulation R-Value: R-4.2 minimum at 70 deg F.
   7. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
   8. NFPA 90A and NFPA 90B compliant.
   9. The sound attenuation (insertion loss) of the acoustical flexible air duct shall meet or exceed the values tabulated below

Straight Duct Insertion Loss in Decibels per Length of 10 Feet with No Airflow

Acoustical Flexible Air Duct Inner Diameter	Octave Band Center Frequency (Hz)						
	125	250	500	1000	2000	4000	8000
6 Inches	20	25	30	33	30	25	22
10 Inches	18	20	25	28	25	22	20
16 Inches	15	18	20	25	22	15	15

C. Flexible Duct Attachment:
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.

2.12 FLEXIBLE CONNECTORS

A. Manufacturers:
1. Durodyne.
2. Ventfabrics.

B. Materials: Flame-retardant or noncombustible fabrics. NFPA 90A compliant.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. 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 .

E. 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 .

F. 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 (Minus 55 to plus 260 deg C).

G. 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 .

H. 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.

2.13 DUCT SECURITY BARS

A. Description: Field- or factory-fabricated and field-installed duct security bars.

B. Configuration:
1. Sleeve: 3/16-inch , continuously welded steel frames, to be poured in place or set with concrete block or welded or bolted to wall, one side only. Duct connections on both sides.
2. Bars: Tool-resistant, steel, 7/8 inch diameter, spaced so that no opening is larger than 5 inches .

2.14 DUCT ACCESSORY HARDWARE

A. 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.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts**.**

B. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless integral backdraft damper is provided, and on outside air intakes as close as possible to the exterior. Separate backdraft damper is not required where control damper is indicated, or otherwise indicated

C. 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. Provide elevated dial or shaft extension for insulated ducts.
1. Utilize aluminum framed and blades for volume dampers in wet air streams, utilize galvanized steel blades and frames in all other locations.

2. Cut slot in end of volume damper rod (Quadrant End) to indicate blade position.
3. Provide galvanized sheet metal "hat section" for volume dampers on ducts with exterior insulation so that quadrant will be exposed.
4. Unless indicated otherwise below or on drawings volume dampers shall be standard design:
    a. Spaces with sound rating NC 30 and below: Low Leakage
    b.

D. Install cable-driven remote volume dampers for all volume dampers located in inaccessible ceilings or as indicated on Contract Drawings.
1. Locate wall box within 10 feet in accessible location.
2. Wall box shall be recessed-type in finished spaces.

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. Automatic balancing dampers installation
1. Install dampers at locations indicated on the drawings and in accordance with manufacturer's installation instructions.
2. Install dampers square and free from racking with blades orientation as scheduled or required.
3. Do not compress or stretch damper frame into duct or opening.
4. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jackshaft.
5. Control damper shall be installed in horizontal or vertical applications.
6. Install with minimum 5 diameters straight duct upstream of damper.
7. Where installed in horizontal applications, the set-point adjustment indicator shall be placed at the ‘6 o’clock position’, with the blade running vertically.
8. Where installed in horizontal applications, the set-point adjustment indicator shall be placed at the ‘12 o’clock position’.

H. Install fire and smoke dampers according to UL listing.

I. Fire Damper installation is required for all ductwork penetrating fire-rated walls, floors, and ceilings. Smoke damper installation is required for all ductwork penetrating smoke-rated partitions. Coordinate location and rating of fire and smoke dampers with Architectural Drawings. Provide dampers where required even if not shown on Mechanical Drawings.

J. Install fire and smoke dampers, with fusible links, according to manufacturer’s UL-approved written instructions.

K. Locate duct silencers a minimum of two equivalent duct diameters from elbows and fittings.

L. Install duct security bars. Construct duct security bars from 0.164-inch steel sleeve, continuously welded at all joints and 1/2-inch- diameter steel bars, 6 inches (150 mm) o.c. in each direction in center of sleeve. Weld each bar to steel sleeve and each crossing bar. Weld 2-1/2-by-2-1/2-by-1/4-inch steel angle to 4 sid

sleeve. Connect duct security bars to ducts with flexible connections. Provide 12-by-12-inch (300-by-300-mm) hinged access panel with cam lock in duct in each side of sleeve.

M. Sound Attenuators
1. Install where shown on Drawings in accordance with the manufacturer's recommendations to obtain the published acoustical and air flow performance.
2. Duct Silencer baffles should be oriented so as to be parallel to the plane of the turn if the silencer is located in a position less than 3 duct diameters in distance from the elbow. The duct diameter shall be based upon the maximum duct cross sectional dimension of the sound attenuator.
3. Do not locate rectangular sound attenuators within one duct diameter from elbows, fan suction or discharge openings, takeoffs, etc.
4. Support duct silencers independent of ductwork, **.**

N. Install turning vanes in all rectangular elbows.
1. Ductwork of pressure class +/- 2-inch w.g. or lower: single wall vanes.
2. Ductwork of pressure class +/- 3-inch w.g. and greater: double wall vanes.
3. Acoustical turning vanes are not to be used unless specifically indicated on the Contract Drawings.

O. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
1. On upstream **and downstream** side of duct coils.
2. Upstream **and downstream** from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from control 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.

P. Install access doors with swing against duct static pressure.

Q. Access Door Sizes:
1. Rectangular duct larger than 30 inches: 24 by 24 inches .
2. Rectangular duct up to 30 inches: 16 by 20 inches .
3. Rectangular duct up to 18 inches: 12 by 12 inches .
4. For ducts smaller than 18 inches: 2 inch less than duct height by 12 inch length.

R. Label access doors according to Section 23 05 53 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

S. Install duct test holes where required for testing and balancing purposes.

T. Flexible Connectors

1. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
2. Allow at least 1 inch slack in flexible connections to insure that no vibration is transmitted from fan to ductwork
3. On fans with a total static pressure of 5 inch w.g. or greater, 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.

U. Flexible Duct
1. Connect diffusers or light troffer boots to low pressure ducts with maximum 84-inch lengths of flexible duct clamped or strapped in place.
2. Connect flexible ducts to metal ducts with draw bands.
3. Installation of the acoustical flexible air duct shall be in accordance with the manufacturer's instructions and recommended procedures. Bends shall not have a radius of curvature smaller than 1.5 duct diameters. Before entering the rear of any diffuser, flexible duct must be straight and perpendicular to the diffuser for a minimum of 3 duct diameters.
4. Flexible duct must not be installed directly at the inlet or discharge of any volume control device

3.02 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

2

SECTION 26 08 00

COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

A. Section includes:

1. Electrical equipment connected to Normal electrical systems, including the following:

   a. Motor-control centers.
   b. Transformers.
   c. Secondary service electrical systems.
   d. Distribution and branch-circuit panelboards.
   e. Lightning protection systems.
   f. Grounding systems.

2. Electrical equipment connected to Essential electrical systems that provide an alternative source of power in the absence of power from the Normal electrical system, including the following:

   a. Motor-control centers.
   b. Secondary service electrical systems.
   c. Distribution and branch-circuit panelboards.
   d. Lighting protection systems.
   e. Grounding systems.
   f. Generators.
   g. UPS.

3. Controls and instrumentation, including the following:

   a. Equipment monitoring systems.
   b. Energy monitoring and control systems.
   c. Electrical metering and metering system.
   d. Demand response systems.
   e. Lighting control systems.
   f. Security systems.
   g. Fire-alarm systems.

B. Related Requirements:
   1. Section 019113 "General Commissioning Requirements" for general commissioning process requirements and Commissioning Coordinator responsibilities.

1.03 DEFINITIONS

A. BoD: Basis-of-Design Document, as defined in Section 019113 "General Commissioning Requirements."

B. Cx: Commissioning, as defined in Section 019113 "General Commissioning Requirements."

C. CxA: Commissioning Authority, as defined in Section 019113 "General Commissioning Requirements."

D. OPR: Owner's Project Requirements, as defined in Section 019113 "General Commissioning Requirements."

E. "Systems," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.04 INFORMATIONAL SUBMITTALS

A. Construction Checklists by CxA: Draft construction checklists will be created by CxA for Contractor review.

B. Construction Checklists by Contractor: Include the following and comply with requirements in Section 019113 "General Commissioning Requirements" for construction checklists:
1. Instrumentation and control for electrical systems.
2. Instrumentation and control for lighting control systems.
3. Liquid-filled transformers.
4. Dry-type transformers.
5. Instrument transformers.
6. Switchgear and switchboard assemblies rated 1200 A or greater.
7. Network protectors.
8. Surge protective devices.
9. Protective relays.
10. Metering devices.
11. Grounding systems.
12. Ground-fault protection systems.
13. Panelboards.
14. Receptacles and devices.
15. Automatic transfer switches.
16. Variable-frequency drives.
17. UPS systems.
18. Lighting.

1.05 QUALITY ASSURANCE

A. Test Equipment and Instruments: For all test equipment and instruments to be used in conducting Cx tests by Contractor, perform the following:
1. Submit test equipment and instrumentation list. For each equipment or instrument, identify the following:
a. Equipment/instrument identification number.

b. Planned Cx application or use.
c. Manufacturer, make, model, and serial number.
d. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.

2. Test equipment and instrumentation must meet the following criteria:
a. Capable of testing and measuring performance within the specified acceptance criteria.
b. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
c. Be maintained in good repair and operating condition throughout duration of use on Project.
d. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.

B. Proprietary Test Instrumentation and Tools:
1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, perform the following:
a. Submit proprietary instrumentation and tools list. For each instrument or tool, identify the following:
1) Instrument or tool identification number.
2) Equipment schedule designation of equipment for which the instrument or tool is required.
3) Manufacturer, make, model, and serial number.
4) Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.
b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
c. Electrical proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONSTRUCTION CHECKLISTS

A. Prepare detailed construction checklists for electrical systems, subsystems, equipment, and components. Complete and submit construction checklists.

3.02 CONSTRUCTION CHECKLIST REVIEW

A. Review and provide written comments on draft construction checklists. CxA will create required draft construction checklists and provide them to Contractor.

B. Return draft Construction Checklist review comments within 10 days of receipt.

C. When review comments have been resolved, CxA will provide final construction checklists, marked "Approved for Use, (date)."

D. Use only construction checklists, marked "Approved for Use, (date)."Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

3.03 GENERAL TESTING REQUIREMENTS

A. Certify that electrical systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating according to the Contract Documents and approved Shop Drawings and submittals.

B. Certify that electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved Shop Drawings and submittals, and that pretest set points have been recorded.

C. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

D. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions to verify compliance with acceptance criteria.

E. Test systems, assemblies, subsystems, equipment, and components operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and response according to acceptance criteria.

F. Construction Checklists: Prepare and submit detailed construction checklists for electrical systems, subsystems, equipment, and components.
   1. Contributors to development of construction checklists must include, but are not limited to, the following:
      a. Electrical systems and equipment installers.
      b. Electrical instrumentation and controls installers.

G. Perform tests using design conditions, whenever possible.
   1. Simulated conditions may, with approval of Architect, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA, and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
   2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
   3. Cx test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.

H. If tests cannot be completed because of a deficiency outside the scope of the electrical system, document the deficiency and report it to Owner. After deficiencies are resolved, reschedule tests.

I. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.

J. Coordinate schedule with, and perform Cx activities at the direction of the Cx.

K. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance tests requirements specified in Sections specifying electrical systems and equipment.

L. Provide qualified testing and inspecting agency personnel in accordance with Sections specifying electrical systems and equipment instrumentation, tools, and equipment to complete and document the following:
1. Performance tests.
2. Demonstration of a sample of performance tests.
3. Commissioning tests.
4. Commissioning test demonstrations.

3.04 CX TESTS FOR ELECTRICAL SYSTEMS

A. Verification of Normal Electrical System Operation:
1. Prerequisites: Acceptance of results for construction checklists for Division 26 electrical components associated with Normal electrical system.
2. Equipment and Systems to Be Tested: Division 26 electrical equipment.
3. Test Purpose: Verify operation of Normal electrical system.
4. Test Conditions: Energize components of Normal electrical system, one at a time.
5. Acceptance Criteria: Proper operation of Normal electrical system over a 24-hour period.

B. Verification of Essential Electrical System Operation:
1. Prerequisites:
a. Acceptance of results for construction checklists for Division 26 electrical components associated with Essential electrical system.
b. Completion of "Verification of Normal Electrical System Operation" tests.
2. Equipment and Systems to Be Tested: Division 26 electrical equipment.
3. Test Purpose: Verify operation of Essential electrical system.
4. Test Conditions:
a. Energize components of Normal electrical system.
b. Simulate a failure of Normal electrical system.
5. Acceptance Criteria: Transfer of power from Normal to Essential electrical system within OPR.

C. Verification of Control and Instrumentation:
1. Prerequisites: Acceptance of results for construction checklists.
a. Section 26 09 23 "Lighting Control Devices."
b. Section 26 09 43.23 "Relay-Based Lighting Controls."
c. Section 26 27 13 "Electricity Metering."

D. Test Purpose: Verify operation of control and monitoring systems for Normal and Essential electrical systems.

E. Test Conditions:

1. Energize components of Normal electrical system.
2. Test operation of equipment.

F. Acceptance Criteria: Operation of equipment according to OPR.

END OF SECTION

SECTION 26 11 16.12

SECONDARY UNIT SUBSTATIONS WITH SWITCHBOARD SECONDARY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Manufactured units.
2. Medium-voltage terminal compartment section.
3. Medium-voltage metal-enclosed switchgear section.
4. Medium-voltage instruments section.
5. Dry-type transformer section.
6. Secondary distribution section switchboard.
7. Low-voltage instruments section.
8. Identification devices.

B. Related Requirements:
1. Section 26 0010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 26 0011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 26 0513 "Medium-Voltage Cables" for requirements for terminating cables in incoming section of substation.

1.02 DEFINITIONS

A. ICCB: Insulated-case circuit breaker.

B. MCCB: Molded-case circuit breaker.

C. NETA ATS: Acceptance testing specification.

D. PCB: Polychlorinated biphenyl.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include rated capacities, operating characteristics, and 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.
2. Dimensioned plans and elevations showing major components and features.

a. Include a plan view and cross section of equipment base, showing clearances, manufacturer's recommended workspace that accounts for breaker service and removal, and locations of penetrations for grounding and conduits.
3. One-line diagram.
4. List of materials.
5. Nameplate legends.
6. The material, size and number of bus bars, and current rating for each bus, including mains and branches of phase, neutral, and ground buses.
7. Short-time and short-circuit current ratings of secondary unit substations and components.
8. Ratings of individual protective devices.

C. Design Data:
1. Time-Current Characteristic Curves: For overcurrent protective devices.
2. Primary Fuses: Submit recommendations and size calculations.
3. Utility company's metering provisions with indication of approval by utility company.

1.04 INFORMATIONAL SUBMITTALS

A. Provide ¼" scale drawing demonstrating that installation has been coordinated with work of other trades. Use actual dimensions from approved equipment submittals to coordinate layout and installation of substation and components with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Product Certificates: For secondary unit substations, signed by product manufacturer.

C. Factory test reports.

D. Field quality-control reports.

1.05 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. Spare Fuses: Six of each type and rating of fuse and fusible device used, except for medium-voltage fuses. Include spares for the following:
a. Primary disconnect fuses.
b. Potential transformer fuses.
c. Control power fuses.
d. Fuses and fusible devices for fused circuit breakers.
e. Fuses for secondary fusible devices.
2. Spare Indicating Lights: Six of each type installed.
3. Touchup Paint: Three half-pint containers of paint matching enclosure's exterior finish.
4. Primary Switch Contact Lubricant: One container(s).
5. One set(s) of spare mounting gaskets for bushings, handholes, and the gasket between relief cover and flange of pressure-relief device.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver in shipping splits in sizes that can be moved past obstructions in delivery path.

B. Coordinate delivery of secondary unit substations to allow movement into designated space.

C. Store secondary unit substation components protected from weather and so condensation will not form on or in units. Provide temporary heating in accordance with manufacturer's instructions.

D. Handle secondary unit substation components in accordance with manufacturer's instructions. Use factory-installed lifting provisions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Square D; Schneider Electric USA.
2. ABB, Electrification Business.
3. Eaton.
4. Siemens Industry, Inc., Energy Management Division.

2.02 SYSTEM DESCRIPTION

A. Description: Medium-voltage, primary incoming section; transformer section; and low-voltage secondary switchgear section; and including coordinated circuit breakers, fusible switches, and metering components.

B. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by a qualified electrical testing agency, and marked for intended location and application.

C. Comply with IEEE C2.

D. Comply with IEEE C37.121.

2.03 MANUFACTURED UNITS

A. Indoor Unit Arrangement: Single assembly.

B. Outdoor Unit Arrangement: Single assembly.
1. Weatherproof, listed for installation outdoors, complying with IEEE C37.20.1.
2. Aisleless Construction: Full-height doors in front of basic weatherproof equipment.

C. Connections between the primary device and transformer must be cable, and between the transformer and secondary must be flexible bus braid unless noted otherwise.

D. Indoor Enclosure: Steel.

E. Outdoor Enclosure: Weatherproof, galvanized steel, listed for installation outdoors, complying with IEEE C37.20.1. Aisleless, full-height doors, with provisions for padlocking, in front of basic weatherproof equipment. Integral structural-steel base frame with factory-applied asphaltic undercoating.
   1. Each compartment must have the following features:
      a. Structural design and anchorage adequate to resist loads imposed by 125 mph wind.
      b. Space heater operating at one-half or less of rated voltage, sized to prevent condensation, controlled by thermostats to maintain temperature of each section above expected dew point.
      c. Louvers equipped with insect and rodent screens and filters, and arranged to permit air circulation while excluding rodents and exterior dust.
      d. Weatherproof ground-fault circuit interrupter duplex receptacle.
      e. Power for heaters and receptacles must be provided by control power transformer.
      f. Skid Mounted: Mount each shipping group on an integral base frame as a complete weatherproof unit.

F. Enclosure Finish:
   1. Outdoor Finish: Provide factory-applied finish in manufacturer's standard color, including under surfaces treated with corrosion-resistant undercoating.
   2. Indoor Finish: Provide factory-applied finish in manufacturer's standard gray over a rust-inhibiting primer on treated metal surface.
   3. Severe Environment Finish: Provide factory-applied corrosion-resistant finish in manufacturer's standard color that withstands 480 hours of exposure to the salt spray test specified in ASTM B117 without loss of paint or release of adhesion of the paint primer coat to the metal surface in excess of 1/16 inch from the test mark. The scribed test mark and test evaluation must be conducted in accordance with ASTM D1654, with a rating of not less than 7 arrived at in accordance with Table 1 (procedure A). Cut edges or otherwise damaged surfaces of hot-dip galvanized sheet steel or mill-galvanized sheet steel must be coated with a manufacturer's standard zinc-rich paint.

2.04 MEDIUM-VOLTAGE TERMINAL COMPARTMENT SECTION

A. Primary Incoming Section: Terminal assembly with adequate space for incoming-cable terminations and surge arresters, complying with NEMA SG4 and meeting thermal, mechanical, and dielectric requirements specified for the transformer section.

B. Ratings: Suitable for application in three-phase, 60 Hz, solidly grounded-neutral system.

C. System Voltage: 13.8 kV nominal; 15 kV maximum.

D. Surge Arresters: Comply with IEEE C62.11, Distribution Class; metal-oxide-varistor type, connected in each phase of incoming circuit and ahead of disconnecting device.

2.05 MEDIUM-VOLTAGE METAL-ENCLOSED SWITCHGEAR SECTION

A. Metal-enclosed, air-interrupter switchgear, with fuses, complying with IEEE C37.20.3.
   1. Switchgear must be arc-resistant, complying with IEEE C37.20.7, Type 2A.

B. Ratings: Comply with IEEE C37.04; and suitable for application in three-phase, 60 Hz, solidly grounded-neutral system.
   1. System Voltage: As indicated on construction documents
   2. Design Level of Available-Source Fault Current: Integrated short-circuit rating consistent with value of fault current indicated.
   3. Main-Bus Rating: Continuous bus rating as indicated on construction documents.

C. Interrupter Switches: Stationary, gang operated, and suitable for application at maximum short-circuit rating of integrated switchgear assembly.
   1. Rating: 600 A continuous duty and load break.
   2. Two-Time Duty-Cycle Fault Closing: 40 000 A, asymmetrical.
   3. Switch Action: No external arc and no significant quantities of ionized gas released into the enclosure.
   4. Switch Construction: Supported entirely by interior framework of structure, with copper switchblades and stored-energy operating mechanism.
   5. Phase Barriers: Full length of switchblades and fuses for each pole; designed for easy removal; allow visual inspection of switch components if barrier is in place.
   6. Protective Shields: Cover live components and terminals.
      a. Fuse Mounts: Single-frame mounted and de-energized when switch is open.
   7. Mechanical Interlock: Prevent opening switch compartment door unless switchblades are open, and prevent closing switch if door is open. Interlock air-interrupter switch with transformer secondary main circuit breaker, preventing switch from being opened or closed unless secondary main circuit breaker is open.
   8. Window: Permits viewing switch-blade positions when door is closed.
   9. Accessory Set: Tools and miscellaneous items required for interrupter switchgear test, inspection, maintenance, and operation. Include fuse-handling tool as recommended by switchgear manufacturer.

D. Fuses: Sizes recommended by secondary unit substation manufacturer, considering fan cooling, temperature-rise specification, and cycle loading.
   1. Expulsion Fuses: Furnished in disconnect-type mountings and renewable with replacement fuse units. Gases emitted on interruption are controlled and silenced by chambers designed for that purpose.
   2. Indicator integral with each fuse to show when it has blown.
   3. Spares: Include three fuses in use and three spare fuses in storage clips in each switch.

E. Surge Arresters: Comply with IEEE C62.11, Distribution Class; metal-oxide-varistor type, with ratings as indicated, connected in each phase of incoming circuit and ahead of disconnecting device.

2.06 MEDIUM-VOLTAGE INSTRUMENTS SECTION

A. Instrument Transformers: Comply with IEEE C57.13.

1. Potential and Current Transformers: Burden and Accuracy Class suitable for connected meters.

B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems.
   1. Inputs from sensors or 5 A current-transformer secondaries, and potential terminals rated to 600 V.
   2. Switch-selectable digital display with the following features:
      a. Phase Currents, Each Phase: Plus or minus 1 percent.
      b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
      c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
      d. Three-Phase Real Power: Plus or minus 2 percent.
      e. Three-Phase Reactive Power: Plus or minus 2 percent.
      f. Power Factor: Plus or minus 2 percent.
      g. Frequency: Plus or minus 0.5 percent.
      h. Integrated Demand, with Demand Interval Selectable from 5 to 60 Minutes: Plus or minus 2 percent.
      i. Accumulated energy, in megawatt-hours, plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.
   3. Communications module suitable for remote monitoring of meter quantities and functions. Interface communication and metering requirements in accordance with Section 26 0913 "Electrical Power Monitoring and Control."
   4. Mounting: Display and control unit that is flush or semiflush mounted in instrument compartment door.

2.07 DRY-TYPE TRANSFORMER SECTION

A. Description: IEEE C57.12.01, IEEE C57.12.50, and dry-type, two-winding, secondary unit substation transformer.

B. Primary Incoming Section: Transformer cover-mounted bushings. The bushings must meet thermal, mechanical, and dielectric requirements as specified for the transformer section.

C. Style:
   1. Totally enclosed, nonventilated, vacuum-pressure, impregnated type, and with insulation system rated at 220 deg C with an 80 deg C average winding temperature rise above a maximum ambient temperature of 104 deg F.

D. Cooling System:
   1. Class AA/FA, air cooled with provisions for future forced-air rating, complying with IEEE C57.12.01.
      a. Automatic forced-air cooling system controls, including thermal sensors, fans, control wiring, temperature controller with test switch, power panel with current-limiting fuses, indicating lights, alarm, and alarm-silencing relay.
      b. Include mounting provision for fans.

E. Insulation Materials: IEEE C57.12.01, rated 220 deg C.
   1. Insulation Temperature Rise: 80 deg C, maximum rise above 104 deg F.

F. BIL: 60 kV.

G. Full-Capacity Voltage Taps: Four nominal 2.5 percent taps, two above and two below rated primary voltage.

H. Impedance: 7.3 percent.

I. High-Temperature Alarm: Sensor at transformer with local audible and visual alarm and contacts for remote alarm.

2.08 SECONDARY DISTRIBUTION SECTION SWITCHBOARD

A. The secondary distribution section must be drawout,, low-voltage switchgear, complying with NEMA PB 2 and UL 891.

B. Switchboard Structure: Front and rear accessible.
1. Match and align the front and rear of the switchgear.
2. Comply with UL requirements for service entrance equipment.

C. Switchboard Bus:
1. Use bus bars to connect compartments and vertical sections. Cable connections are not permitted.
2. Main Phase Bus: Uniform capacity the entire length of section.
3. Neutral Bus: 100 percent of phase-bus ampacity, except as indicated. Equip bus with pressure-connector terminations for outgoing circuit neutral conductors. Include braces for neutral-bus extensions for busway feeders.
4. Vertical Section Bus: Extend to spaces for future circuit breakers.
5. Phase- and Neutral-Bus Material:
   a. Hard-drawn copper of 98 percent minimum conductivity, with copper feeder circuit-breaker line connections.
6. Ground Bus: Hard-drawn copper of 98 percent minimum conductivity, with pressure connector for feeder and branch-circuit ground conductors, minimum size 1/4-by-2 inch.
7. Neutral bus equipped with pressure-connector terminations for outgoing circuit neutral conductors. Neutral-bus extensions for busway feeders are braced.
8. Neutral Disconnect Link: Bolted, uninsulated, 1/4-by-2 inch copper bus, arranged to connect neutral bus to ground bus.

D. Switchboard Arrangement:
1. Main Disconnect Device(s): MCCBs.
2. Feeder Protective Devices: MCCBs.

E. MCCBs (to 2500 A): Fixed-mounted, manually operated air-circuit breakers. Comply with UL 489.
1. With quick-make, quick-break, over-center switching mechanism that is mechanically trip-free, and its position is shown by the position of the handle. With manual push-to-trip push button.
2. Solid-state monitoring and tripping system to provide system status monitoring, adjustable time-current protection, and shunt trip.
   a. Interchangeable current sensors and timing circuits for adjustable time-current protection settings and status signals.

b. With trip-setting dials or interchangeable plugs to establish the continuous trip of the circuit breaker. Plugs must not be interchangeable between frames, and the breaker may not be closed without the plug. With neutral ground-fault sensor.
c. Time-current adjustments to achieve protective-device coordination as follows:
   1) Adjustable long-time delay.
   2) Adjustable short-time setting and delay to shape the time-current curve.
   3) Adjustable instantaneous setting.
   4) Individually adjustable ground-fault setting and time delay.
d. With built-in connector to test the long-time delay, instantaneous, and ground-fault functions of the breaker. Provide one test set for testing installed circuit breakers with 225 A frame and higher.
e. With built-in digital ammeter display, showing load current and tripping cause.

F. MCCBs (1600 to 2500 A): Fixed-mounted, manually operated air-circuit breakers. Comply with UL 489.
   1. With quick-make, quick-break, over-center switching mechanism that is mechanically trip-free, and its position is shown by the position of the handle. With manual push-to-trip push button.
   2. Solid-state monitoring and tripping system to provide system status monitoring, adjustable time-current protection, and shunt trip.
      a. Interchangeable current sensors and timing circuits for adjustable time-current protection settings and status signals.
      b. LED indicators or display, with manual reset, to show reasons of automatic trip.
      c. Display panel to indicate that the status of the system circuitry is fully operational, or give fault location based on automatic diagnosis.
      d. Trip the circuit breaker when closing on a fault.
      e. Time-current adjustments to achieve protective-device coordination as follows:
         1) Adjustable long-delay pickup and time.
         2) Individual adjustments for short-delay pickup, time, and I-squared-t setting.
         3) Adjustable instantaneous pickup.
         4) Individually adjustable ground-fault pickup and time, with I-squared-t setting.
      f. One test kit to test each trip function.
      g. Battery backup for informational displays after automatic trip, with battery status indicator.

2.09 LOW-VOLTAGE INSTRUMENTS SECTION

A. Instrument Transformers: Comply with IEEE C57.13.
   1. Potential Transformers: Secondary voltage rating of 120 V and NEMA C 12.11 Accuracy Class of 0.3 with burdens of W, X, and Y.
   2. Current Transformers: Burden and Accuracy Class suitable for connected relays, meters, and instruments.

B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems.
   1. Inputs from sensors or 5 A current-transformer secondaries, and potential terminals rated to 600 V.
   2. Switch-selectable digital display with the following features:
      a. Phase Currents, Each Phase: Plus or minus 1 percent.
      b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
      c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
      d. Three-Phase Real Power: Plus or minus 2 percent.
      e. Three-Phase Reactive Power: Plus or minus 2 percent.
      f. Power Factor: Plus or minus 2 percent.
      g. Frequency: Plus or minus 0.5 percent.
      h. Integrated Demand, with Demand Interval Selectable from 5 to 60 Minutes: Plus or minus 2 percent.
      i. Accumulated energy, in megawatt hours, plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.
   3. Communications module suitable for remote monitoring of meter quantities and functions. Interface communication and metering requirements in accordance with Section 26 0913 "Electrical Power Monitoring and Control."
   4. Mounting: Display and control unit that is flush or semiflush mounted in instrument compartment door.

C. Relays: Comply with IEEE C37.90, types and settings as indicated; with test blocks and plugs.

D. Surge Suppression: Factory installed as an integral part of the low-voltage switchgear, complying with UL 1449 SPD, Type 1, with the following features and accessories:
   1. Integral disconnect switch.
   2. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
   3. Indicator light display for protection status.
   4. Form-C contacts rated at 5 A and 250 V(ac), one N.O. and one N.C., for remote monitoring of protection status.
   5. Surge counter.

E. Control Power Supply: Control power transformer supplying 120 V control circuits through secondary disconnect devices.

F. Control Wiring: Factory installed, complete with bundling, lacing, and protection; and complying with the following:
   1. Flexible conductors for No. 8 AWG and smaller, for conductors across hinges and for conductors for interconnections between shipping units.
   2. Conductors sized in accordance with NFPA 70 for duty required.

G. Maintenance Tools: Furnish tools and miscellaneous items required for circuit-breaker and switchgear test, inspection, maintenance, and operation.
   1. Racking handle to manually move circuit breaker between "connected" and "disconnected" positions.
   2. Portable test set for testing functions of circuit-breaker, solid-state trip devices without removal from switchboard.

3. Relay and meter test plugs suitable for testing switchgear meters and switchgear class relays.
4. Circuit-Breaker Removal Apparatus: Portable, floor-supported, roller-base, elevating carriage arranged for moving circuit breakers in and out of compartments.
5. Spare-Fuse Cabinet: Identified and compartmented steel box or cabinet with lockable door.
6. Storage for Manual: Include a rack or holder, near the operating instructions, for a copy of maintenance manual.

2.10 IDENTIFICATION DEVICES

A. Compartment Nameplates: Engraved, laminated-plastic or metal nameplate for each compartment, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 26 0553 "Identification for Electrical Systems."

2.11 SOURCE QUALITY CONTROL

A. Factory Tests:
1. Perform design and routine tests in accordance with standards specified for components. Conduct transformer tests in accordance with IEEE C57.12.90. Conduct switchgear and switchboard tests in accordance with NEMA C37.51.
2. Perform the following factory-certified tests on each secondary unit substation:
a. Resistance measurements of windings on the rated voltage connection and on tap extreme connections.
b. Ratios on the rated voltage connection and on tap extreme connections.
c. Polarity and phase relation on the rated voltage connection.
d. No-load loss at rated voltage on the rated voltage connection.
e. Exciting current at rated voltage on the rated voltage connection.
f. Impedance and load loss at rated current on the rated voltage connection and on tap extreme connections.
g. Applied potential.
h. Induced potential.
i. Temperature Test: If a transformer is supplied with auxiliary cooling equipment to provide more than one rating, test at lowest kVA Class ONAN or Class AA rating and highest kVA Class ONAF or Class AFA rating.
1) Temperature test is not required if a record of a temperature test on an essentially duplicate unit is available.
j. Owner will witness required factory tests. Notify Architect at least 14 days before date of tests and indicate their approximate duration.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and space conditions for compliance with requirements for secondary unit substations and other conditions affecting performance of the Work.

B. Examine roughing-in of conduits and grounding systems to verify the following:
1. Wiring entries comply with layout requirements.

2. Entries are within conduit-entry tolerances specified by manufacturer, and no feeders will have to cross section barriers to reach load or line lugs.

C. Examine walls, floors, roofs, and concrete bases for suitable conditions for secondary unit substation installation.

D. Verify that ground connections are in place and that requirements in Section 26 0526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance must be 5 ohms at secondary unit substation location.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with applicable portions of NECA 400, NECA 410, NECA 430, and NEMA SG 11.

B. Install secondary unit substations on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 03 3000 "Cast-in-Place Concrete."

C. Comply with requirements for vibration isolation and seismic control devices specified in Section 26 0529 "Hangers and Supports for Electrical Systems" and Section 26 0548.16 "Seismic Controls for Electrical Systems."

D. Maintain minimum clearances and workspace at equipment in accordance with manufacturer's instructions and NFPA 70.

3.03 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."
1. Install the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 ft. apart.
2. Install arc-flash warning labels specified in Section 26 0573.19 "Arc-Flash Hazard Analysis."

B. Operating Instructions: Place printed operating instructions for secondary unit substations, including key interlocking, control sequences, elementary single-line diagram, and emergency procedures with the maintenance materials.

3.04 CONNECTIONS

A. Ground equipment in accordance with Section 26 0526 "Grounding and Bonding for Electrical Systems."
1. At Interior Locations: For grounding to grounding electrodes, use bare copper cable not smaller than No. 4/0 AWG. Bond surge arrester and neutrals directly to the transformer enclosure and then to the grounding electrode system with bare copper conductors. Keep leads as short as practicable with no kinks or sharp bends. Make joints in grounding conductors and loops by exothermic weld or compression connector.

2. At Exterior Locations:
   a. For counterpoise, use tinned bare copper cable not smaller than No. 4/0 AWG, buried not less than 30 inch below grade interconnecting the grounding electrodes. Bond surge arrester and neutrals directly to the transformer enclosure and then to the grounding electrode system with bare copper conductors, sized as shown. Keep lead lengths as short as practicable with no kinks or sharp bends.
   b. Fence and equipment connections must not be smaller than No. 4 AWG. Ground fence at each gate post and corner post and at intervals not exceeding 10 ft.. Bond each gate section to the fence post using 1/8 by 1 inch tinned flexible braided copper strap and clamps.
   c. Make joints in grounding conductors and loops by exothermic weld or compression connector.

B. Connect wiring in accordance with Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables."

3.05 CLEANING

A. After completing equipment installation and before energizing, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish. Vacuum interiors of secondary unit substation sections.

3.06 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Architect authorities having jurisdiction.

B. General Field Testing Requirements:
   1. Comply with the provisions of NFPA 70B Ch. 11, "Testing and Test Methods."
   2. Perform each visual and mechanical inspection and electrical test. Certify compliance with test parameters.
   3. After installing secondary unit substation but before primary is energized, verify that grounding system at the substation is tested at the specified value or less.
   4. After installing secondary unit substation and after electrical circuitry has been energized, test for compliance with requirements.
   5. Visual and Mechanical Inspection:
      a. Verify equipment nameplate data complies with Contract Documents.
      b. Inspect bolted electrical connections for high resistance using one of the following two methods:
         1) Use a low-resistance ohmmeter to compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
         2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS, Table 100.12. Bolt-torque levels must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS, Table 100.12.

C. Switchgear Field Tests:

1. Visual and Mechanical Inspection:
   a. Inspect physical and mechanical condition.
   b. Inspect anchorage, alignment, grounding, and required area clearances.
   c. Verify the unit is clean and shipping bracing, loose parts, and documentation shipped inside cubicles have been removed.
   d. Verify that fuse and circuit-breaker sizes and types correspond to Drawings and coordination study as well as the address of the circuit breaker that is used to identify it in microprocessor-communication software.
   e. Verify that current and voltage-transformer ratios correspond to Drawings.
   f. Confirm correct operation and sequencing of electrical and mechanical interlock systems.
      1) Attempt closure on locked-open devices. Attempt to open locked-closed devices.
      2) Make key exchange with devices operated in off-normal positions.
   g. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
   h. Inspect insulators for evidence of physical damage or contaminated surfaces.
   i. Verify correct barrier and shutter installation and operation.
   j. Exercise active components.
   k. Inspect mechanical indicating devices for correct operation.
   l. Verify that filters are in place and vents are clear.
   m. Inspect control power transformers as follows:
      1) Inspect for physical damage, cracked insulation, broken leads, connection tightness, defective wiring, and overall general condition.
      2) Verify that primary- and secondary-use or circuit-breaker ratings match Drawings and comply with manufacturer's recommendations.
      3) Verify correct functioning of drawout disconnecting and grounding contacts and interlocks.
2. Electrical Tests:
   a. Perform dc voltage insulation-resistance tests on each bus section, phase-to-phase and phase-to-ground, for one minute. If the temperature of the bus is other than plus or minus 20 deg C, adjust the resulting resistance as provided in NETA ATS Table 100.11.
      1) Insulation-resistance values of bus insulation must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Investigate and correct values of insulation resistance less than manufacturer's recommendations or NETA ATS, Table 100.1.
      2) Do not proceed to the dielectric-withstand-voltage tests until insulation-resistance levels are raised above minimum values.
   b. Perform a dielectric-withstand-voltage test on each bus section, each phase-to-ground with phases not under test grounded, in accordance with manufacturer's published data. If manufacturer has no recommendation for this test, it must be conducted in accordance with NETA ATS, Table 100.2. Apply the test voltage for one minute.
      1) If no evidence of distress or insulation failure is observed by the end of the total time of voltage application during the dielectric-withstand-voltage test, the test specimen is considered to have passed the test.
   c. Voltage Transformers:

1) Perform secondary wiring integrity test. Verify correct potential at devices.
2) Verify secondary voltages by energizing the primary winding with system voltage.

d. Perform current-injection tests on the entire current circuit in each section of switchgear.
1) Perform current tests by secondary injection with magnitudes such that a minimum current of 1.0 A flows in the secondary circuit. Verify correct magnitude of current at each device in the circuit.
2) Perform current tests by primary injection with magnitudes such that a minimum of 1.0 A flows in the secondary circuit. Verify correct magnitude of current at each device in the circuit.

e. Verify operation of space heaters.
f. Perform phasing checks on double-ended or dual-source switchgear to ensure correct bus phasing from each source.

D. Medium-Voltage Surge Arrester Field Tests:
1. Visual and Mechanical Inspection:
a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify the arresters are clean.
d. Verify that the ground lead on each device is individually attached to a ground bus or ground electrode.
e. Verify that the stroke counter is correctly mounted and electrically connected if applicable. Record the stroke counter reading.
2. Electrical Test:
a. Perform an insulation-resistance test on each arrester, phase terminal-to-ground. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Replace units that fail to meet recommended minimum insulation resistance listed in the table.
b. Perform a watts-loss test. Evaluate watts-loss values by comparison with similar units and test equipment manufacturer's published data.

E. Instrument Transformer Field Tests:
1. Visual and Mechanical Inspection:
a. Inspect physical and mechanical condition.
b. Verify correct connection of transformers with system requirements.
c. Verify that adequate clearances exist between primary and secondary circuit wiring.
d. Verify the unit is clean.
e. Verify that required grounding and shorting connections provide contact.
f. Verify correct operation of transformer withdrawal mechanism and grounding operation.
g. Verify correct primary- and secondary-fuse sizes for voltage transformers.
h. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
2. Electrical Tests of Current Transformers:
a. Perform insulation-resistance test of each current transformer and its secondary wiring with respect to ground at 1000 V(dc) for one minute. For units with solid-state components that cannot tolerate the applied voltage,

comply with manufacturer's recommendations. Insulation-resistance values of instrument transformers must not be less than values shown in NETA ATS, Table 100.5.

b. Perform a polarity test of each current transformer in accordance with IEEE C57.13.1. Polarity results must agree with transformer markings.

c. Perform a ratio-verification test using the voltage or current method in accordance with IEEE C57.13.1. Ratio errors must comply with IEEE C57.13.

d. Perform an excitation test on transformers used for relaying applications in accordance with IEEE C57.13.1. Excitation results must match the curve supplied by the manufacturer or must comply with IEEE C57.13.1.

e. Measure current circuit burdens at transformer terminals in accordance with IEEE C57.13.1. The measured burdens must match the instrument transformer Accuracy Class rating.

f. Perform insulation-resistance tests on the primary winding with the secondary grounded. Test voltages must comply with NETA ATS, Table 100.5. The insulation-resistance value must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5.

g. Perform dielectric-withstand-voltage tests on the primary winding with the secondary grounded. Test voltages must comply with NETA ATS, Table 100.9. If no evidence of distress or insulation failure is observed by the end of the total time of voltage application, the primary winding is considered to have passed the test.

h. Perform power-factor or dissipation-factor tests in accordance with test equipment manufacturer's published data. Power-factor or dissipation-factor values must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with test equipment manufacturer's published data.

i. Verify that current-transformer secondary circuits are grounded and have only one grounding point in accordance with IEEE C57.13.3.

3. Electrical Tests of Voltage and Potential Transformers:

a. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply the test voltage for one minute in accordance with NETA ATS, Table 100.5. For units with solid-state components that cannot tolerate the applied voltage, follow manufacturer's recommendations. Insulation-resistance values of instrument transformers must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5.

b. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Test voltages must be applied for one minute in accordance with NETA ATS, Table 100.5. Insulation-resistance values of the transformers must not be less than values shown in NETA ATS, Table 100.5.

c. Perform a polarity test on each transformer to verify the polarity marks or H(1)- X(1) relationship. Polarity results must agree with transformer markings.

d. Perform a turns-ratio test on tap positions. Ratio errors must not exceed the tolerances specified in IEEE C57.13.

e. Measure voltage circuit burdens at transformer terminals. Measured burdens must be compared to instrument transformer ratings. The

measured burdens must match the instrument transformer Accuracy Class rating.

f. Perform a dielectric-withstand-voltage test on the primary windings with the secondary windings connected to ground. The dielectric voltage must comply with NETA ATS, Table 100.9. The test voltage must be applied for one minute. If no evidence of distress or insulation failure is observed by the end of the total time of voltage application during the dielectric-withstand-voltage test, the primary windings are considered to have passed the test.

g. Perform power-factor or dissipation-factor tests in accordance with test equipment manufacturer's published data. Power-factor or dissipation-factor values must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with test equipment manufacturer's published data.

h. Verify that voltage-transformer secondary circuits are grounded and have only one grounding point in accordance with IEEE C57.13.3.

F. Microprocessor-Based Protective Relay Field Tests:

1. Visual and Mechanical Inspection:
   a. Record model number, style number, serial number, firmware revision, software revision, and rated control voltage.
   b. Verify operation of light-emitting diodes, display, and targets.
   c. Record passwords for each access level.
   d. Clean the front panel and remove foreign material from the case.
   e. Check tightness of connections.
   f. Verify that the frame is grounded in accordance with manufacturer's instructions.
   g. Set the relay in accordance with results in Section 26 0573.16 "Coordination Studies" and in Section 26 0573.19 "Arc-Flash Hazard Analysis."
   h. Download settings from the relays. Print a copy of the settings for the report and compare the settings to those specified in the coordination study.
2. Electrical Tests:
   a. Perform insulation-resistance tests from each circuit to the grounded frame in accordance with manufacturer's published data.
   b. Apply voltage or current to analog inputs, and verify correct registration of the relay meter functions.
   c. Functional Operation: Check functional operation of each element used in the protection scheme.

G. Liquid-Filled Transformer Section Field Tests:

1. Visual and Mechanical Inspection:
   a. Inspect physical and mechanical condition.
   b. Inspect impact recorder prior to unloading.
   c. Test dew point of tank gases if applicable.
   d. Inspect anchorage, alignment, and grounding.
   e. Verify the presence of PCB content labeling.
   f. Verify removal of shipping bracing after placement.
   g. Verify the bushings are clean.

h. Verify that alarm, control, and trip settings on temperature and level indicators are set and operate within manufacturer's recommended settings.
i. Verify that cooling fans and pumps operate correctly and have appropriate overcurrent protection.
j. Verify that liquid level in tanks and bushings is within manufacturer's published tolerances.
k. Perform specific inspections and mechanical tests recommended by the manufacturer.
l. Verify presence of transformer surge arresters and that their ratings are as specified.
m. Verify that as-left tap connections are as specified.
n. Verify the presence of surge arresters and that their ratings are as specified.

2. Electrical Tests:
   a. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index; the value of the index must not be less than 1.0.
   b. Perform power-factor or dissipation-factor tests on windings in accordance with test equipment manufacturer's published data. Maximum winding insulation power-factor/dissipation-factor values must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.3.
   c. Measure core insulation resistance at 500 V(dc) if the core is insulated and the core ground strap is removable. Core insulation-resistance values must not be less than 1 megohm at 500 V(dc).
   d. Perform a power-factor or dissipation-factor tip-up test on windings greater than 2.5 kV.
   e. Perform turns-ratio tests at tap positions. Turns-ratio test results must not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If the test fails, replace the transformer.
   f. Perform an excitation-current test on each phase. The typical excitation-current test data pattern for a three-legged core transformer is two similar current readings and one lower current reading. Investigate and correct if the test shows a different pattern.
   g. Measure the resistance of each winding at each tap connection, and record temperature-corrected winding-resistance values in the Operations and Maintenance Manual.
   h. Perform an applied-voltage test on high- and low-voltage windings-to-ground. Comply with IEEE C57.12.91, Sections 10.2 and 10.9.
   i. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.
   j. Remove a sample of insulating liquid in accordance with ASTM D923. Insulating liquid values must comply with NETA ATS, Table 100.4. Sample must be tested for the following:
      1) Dielectric Breakdown Voltage: ASTM D877 or ASTM D1816.
      2) Acid Neutralization Number: ASTM D974.
      3) Specific Gravity: ASTM D1298.

4) Interfacial Tension: ASTM D971.
5) Color: ASTM D1500.
6) Visual Condition: ASTM D1524.
7) Water in Insulating Liquids: ASTM D1533.
8) Power Factor or Dissipation Factor: ASTM D924.

k. Remove a sample of insulating liquid in accordance with ASTM D923 and perform dissolved-gas analysis in accordance with IEEE C57.104 or ASTM D3612.

H. Dry-Type Transformer Section Field Tests:
1. Visual and Mechanical Inspection:
a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, and grounding.
c. Verify that resilient mounts are free and that shipping brackets have been removed.
d. Verify the unit is clean.
e. Verify that alarm, control, and trip settings on temperature and level indicators are set and operate within manufacturer's recommended settings.
f. Verify that cooling fans operate and that fan motors have correct overcurrent protection.
g. Perform specific inspections and mechanical tests recommended by the manufacturer.
h. Verify that as-left tap connections are as specified.
i. Verify the presence of surge arresters and that their ratings are as specified.
2. Electrical Tests:
a. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index; the value of the index must not be less than 1.0.
b. Perform power-factor or dissipation-factor tests on windings in accordance with the test equipment manufacturer's published data. Investigate and correct power-factor values that exceed:
1) 2.0 percent for power transformers.
2) 5.0 percent for distribution transformers.
3) Measure core insulation resistance at 500 V dc if the core is insulated and the core ground strap is removable. Core insulation-resistance values must not be less than 1 megohm at 500 V(dc).
c. Perform a power-factor or dissipation-factor tip-up test on windings greater than 2.5 kV. Tip-up test result exceeding 1.0 percent must be investigated.
d. Perform turns-ratio tests at tap positions. The test results must not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If the test fails, replace the transformer.
e. Perform an excitation-current test on each phase. The typical excitation-current test data pattern for a three-legged core transformer is two similar current readings and one lower current reading. Investigate and correct if the test shows a different pattern.
f. Measure the resistance of each winding at each tap connection.

g. Perform an applied-voltage test on high- and low-voltage windings-to-ground. See IEEE C57.12.91, Sections 10.2 and 10.9. The ac dielectric-withstand-voltage test result must not exceed 75 percent of factory test voltage for one-minute duration. The dc dielectric-withstand-voltage test result must not exceed 100 percent of the ac RMS test voltage specified in IEEE C57.12.91, Section 10.2, for one-minute duration. If no evidence of distress or insulation failure is observed by the end of the total time of voltage application during the dielectric-withstand-voltage test, the test specimen is considered to have passed the test.
h. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.

I. Low-Voltage Power Circuit-Breaker Field Tests:
1. Visual and Mechanical Inspection:
a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, and grounding.
c. Verify that maintenance devices are available for servicing and operating the breaker.
d. Verify the unit is clean.
e. Verify that the arc chutes are intact.
f. Inspect moving and stationary contacts for condition and alignment.
g. Verify that primary and secondary contact wipe and other dimensions vital to satisfactory operation of the breaker are correct.
h. Perform mechanical operator and contact alignment tests on both the breaker and its operating mechanism in accordance with manufacturer's published data.
i. Verify cell fit and element alignment.
j. Verify racking mechanism operation.
k. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
l. Perform adjustments for final protective-device settings in accordance with coordination study provided by end user.
m. Record as-found and as-left operation counter readings.
2. Electrical Tests:
a. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Insulation-resistance values must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Values of insulation resistance less than this table or manufacturer's recommendations must be investigated.
b. Measure contact resistance across each power contact of the circuit breaker. Microhm or dc millivolt drop values must not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's published data is not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
c. Determine long-time pickup and delay by primary current injection. Long-time pickup values must be as specified, and the trip characteristic must

not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors. If manufacturer's curves are not available, trip times must not exceed the value shown in NETA ATS, Table 100.7.

d. Determine short-time pickup and delay by primary current injection. Short-time pickup values must be as specified, and the trip characteristic must not exceed manufacturer's published time-current tolerance band.

e. Determine ground-fault pickup and delay by primary current injection. Ground-fault pickup values must be as specified, and the trip characteristic must not exceed manufacturer's published time-current tolerance band.

f. Determine instantaneous pickup value by primary current injection. Instantaneous pickup values must be as specified and within manufacturer's published tolerances. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.8.

g. Test functions of the trip unit by means of secondary injection. Pickup values and trip characteristic must be as specified and within manufacturer's published tolerances.

h. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils must conform to the manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.20.

i. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.

j. Verify correct operation of auxiliary features, such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free operation, antipump function, and trip unit battery condition. Reset trip logs and indicators. Auxiliary features must operate in accordance with manufacturer's published data.

k. Verify operation of charging mechanism. The charging mechanism must operate in accordance with manufacturer's published data.

J. Insulated-Case/Molded-Case Air-Circuit-Breaker Field Tests:

1. Visual and Mechanical Inspection:
   a. Inspect physical and mechanical condition.
   b. Inspect anchorage and alignment.
   c. Verify the unit is clean.
   d. Operate the circuit breaker to ensure smooth operation.
   e. Inspect operating mechanism, contacts, and arc chutes in unsealed units.
   f. Perform adjustments for final protective-device settings in accordance with the coordination study. Set the protective devices in accordance with results in Section 26 0573.16 "Coordination Studies" and in Section 26 0573.19 "Arc-Flash Hazard Analysis."
2. Electrical Tests:
   a. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to ground with the circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Insulation-resistance values must be in accordance with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1.

Values of insulation resistance less than this table or manufacturer's recommendations must be investigated.

b. Perform a contact/pole-resistance test. Microhm or dc millivolt drop values must not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's published data is not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.

c. Determine long-time pickup and delay by primary current injection. Ground-fault pickup values must be as specified, and the trip characteristic must not exceed manufacturer's published time-current tolerance band, including adjustment factors.

d. Determine short-time pickup and delay by primary current injection. Short-time pickup values must be as specified, and the trip characteristic must not exceed manufacturer's published time-current tolerance band.

e. Determine ground-fault pickup and time delay by primary current injection. Ground-fault pickup values must be as specified, and the trip characteristic must not exceed manufacturer's published time-current tolerance band.

f. Determine instantaneous pickup by primary current injection. Instantaneous pickup values must be as specified and within manufacturer's published tolerances. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.8.

g. Test functions of the trip unit by means of secondary injection. Pickup values and trip characteristic must be as specified and within manufacturer's published tolerances.

h. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils must conform to the manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.20.

i. Verify correct operation of auxiliary features, such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free operation, anti-pump function, and trip unit battery condition. Reset trip logs and indicators. Auxiliary features must operate in accordance with manufacturer's published data.

j. Verify operation of charging mechanism. The charging mechanism must operate in accordance with manufacturer's published data.

K. Low-Voltage Ground-Fault Protection System Field Tests:

1. Visual and Mechanical Inspection:

a. Inspect the components for damage and errors in polarity or conductor routing.

1) Verify that ground connection is made on the source side of the neutral disconnect link and on the source side of ground-fault sensor.

2) Verify that the neutral sensors are connected with correct polarity on both primary and secondary.

3) Verify that phase conductors and the neutral pass through the sensor in the same direction for zero sequence systems.

4) Verify that grounding conductors do not pass through zero sequence sensors.

5) Verify that grounded conductor is solidly grounded.

b. Verify the unit is clean.

c. Operate the circuit breaker to ensure smooth operation.
d. Verify correct operation of functions of the self-test panel if provided.
e. Verify that the control power transformer has adequate capacity for the system.
f. Set pickup and time-delay settings in accordance with "Quality Control" Article. Record appropriate operation and test sequences in accordance with NFPA 70, Article 230, Section 23 0.95 "Ground-Fault Protection of Equipment."

2. Electrical Tests:
a. Measure the system neutral-to-ground insulation resistance with the neutral disconnect link temporarily removed. Replace the neutral disconnect link after testing. System neutral-to-ground insulation resistance must be a minimum of 1 megohm. Correct wiring until the minimum is achieved.
b. Perform ground-fault protective-device pickup tests using primary injection. Results of pickup test must be greater than 90 percent of the ground-fault protective-device pickup setting and less than 1200 A or 125 percent of the pickup setting, whichever is smaller. Adjust or replace the device until these parameters are achieved.
c. For summation-type systems utilizing phase and neutral current transformers, verify correct polarities by applying current to each phase-neutral current-transformer pair. This test also applies to MCCBs utilizing an external neutral current transformer. The ground-fault protective device must operate when current direction is the same relative to polarity marks in the two current transformers. The ground-fault protective device must not operate when current direction is opposite relative to polarity marks in the two current transformers.
d. Measure time delay of the ground-fault protective device at a value equal to or greater than 150 percent of the pickup value. Relay timing must be in accordance with manufacturer's published data but must be no longer than one second at 3000 A in accordance with NFPA 70, Article 230, Section 23 0.95 "Ground-Fault Protection of Equipment."
e. Verify reduced control voltage tripping capability is 55 percent for ac systems and 80 percent for dc systems. Replace the ground-fault system if the reduced control voltage tripping requirement is not achieved, and retest.
f. Verify blocking capability of zone interlock systems. Results of zone-blocking tests must be in accordance with manufacturer's published data and design specifications.

L. Metering Device Field Tests:
1. Visual and Mechanical Inspection:
a. Inspect physical and mechanical condition.
b. Inspect cover gasket, cover glass, condition of spiral spring, disk clearance, contacts, and case shorting contacts, as applicable.
c. Verify the unit is clean.
d. Verify freedom of movement, end play, and alignment of rotating disk(s).
2. Electrical Tests:
a. Verify accuracy of meters at cardinal points. Meter accuracy must be in accordance with manufacturer's published data.
b. Calibrate meters in accordance with manufacturer's published data. Calibration results must be within manufacturer's published tolerances.

c. Verify instrument multipliers. Instrument multipliers must be in accordance with system design specifications.
d. Verify that current-transformer and voltage-transformer secondary circuits are intact. Test results must confirm the integrity of the secondary circuits of current and voltage transformers.

M. Nonconforming Work:
1. Equipment and devices will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

N. Prepare test and inspection reports. Record as-left set points of adjustable devices.

3.07 FOLLOW-UP SERVICE

A. Voltage Monitoring and Adjusting: After Substantial Completion, if requested by Owner, but not more than six months after Final Acceptance, perform the following voltage monitoring:
1. During a period of normal load cycles as evaluated by Owner, perform seven days of three-phase voltage recording at the outgoing section of each secondary unit substation. Use voltmeters with calibration traceable to the National Institute of Science and Technology standards and with a chart speed of not less than 1 inch per hour. Voltage unbalance greater than 1 percent between phases, or deviation of phase voltage from the nominal value by more than plus or minus 5 percent during the test period, is unacceptable.
2. Corrective Action: If test results are unacceptable, perform the following corrective action, as appropriate:
a. Adjust transformer taps.
b. Rebalance loads.
c. Prepare written request for voltage adjustment by electric utility.
3. Retests: Repeat monitoring, after corrective action has been performed, until satisfactory results are obtained.
4. Report:
a. Prepare a written report covering monitoring performed and corrective action taken.
b. For each relay and adjustable circuit breaker, tag the device with adjusting technician's initials and the date of the adjustment. Record the settings and file with test records specified in "Field Quality Control" Article.

B. Infrared Inspection: Perform the survey during periods of maximum possible loading. Remove covers prior to the inspection.
1. After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared inspection of the electrical power connections of the unit substation.
2. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switchgear 11 months after date of Substantial Completion.
3. Instrument: Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1 deg C at 30 deg C.
4. Record of Infrared Inspection: Prepare a certified report that identifies the testing technician and equipment used, and lists the results as follows:
a. Description of equipment to be tested.

b. Discrepancies.
c. Temperature difference between the area of concern and the reference area.
d. Probable cause of temperature difference.
e. Areas inspected. Identify inaccessible and unobservable areas and equipment.
f. Identify load conditions at time of inspection.
g. Provide photographs and thermograms of the deficient area.

5. Act on inspection results in accordance with the recommendations of NETA ATS, Table 100.18. Correct possible and probable deficiencies as soon as Owner's operations permit. Retest until deficiencies are corrected.

END OF SECTION

SECTION 31 23 00

EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes (but Is Not Necessarily Limited to):
   1. Rough grading earthwork.
   2. Excavating, trenching, and backfill.

2

1.02 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe or conduit in a trench, including haunches to support sides of pipe or conduit.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed between the subbase course and asphalt paving

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

F. Engineered Fill: Fill material placed at the direction of the soils engineer.

G. Excavation: Removal of material encountered above subgrade elevations.
   1. Additional Excavation: Excavation below subgrade elevations as directed by College Project Manager. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
   2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.
   3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by College Project Manager. Unauthorized excavation, as well as remedial work directed by College Project Manager, shall be without additional compensation.

H. Fill: Soil materials used to raise existing grades.

I. Rock (project definition): Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering or ripping, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-wide, short-tip-radius rock bucket; rated at not less than 120-hp flywheel power with bucket-curling force of not less than 25,000 lbf and stick-crowd force of not less than 18,700 lbf; measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 45,000-lbf breakout force; measured according to SAE J-732.

J. Rock (ASTM definition): Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that when tested by an independent geotechnical testing agency, according to ASTM D 1586, exceeds a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm).

K. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

L. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

M. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

N. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. General Provisions Section – Testing and Inspection

B. Section 31 23 33 – Trenching, Backfilling and Compaction.

C. Section 33 05 00 - Installation of Buried Pipe.

D. Section 33 41 00 – Subdrainage.

1.04 SUBMITTALS

A. Product Data: For the following:
1. Drainage fabric.
2. Separation fabric.

B. Samples: For the following:
1. 10-lb. samples, sealed in airtight containers, of each proposed soil material from on-site or off-site borrow sources. This does not include District stockpile.
2. 12-by-12-inch sample of drainage fabric.
3. 12-by-12-inch sample of separation fabric.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance with the following requirements:
   1. Classification according to ASTM D 2487 of each on-site or off-site borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 1557 for each on-site or off-site borrow soil material proposed for fill and backfill.
   3. Laboratory compaction curve according to ASTM D 1557 for each on-site or off-site borrow soil material proposed for fill and backfill.

D. Blasting will not be permitted.

1.05 REFERENCES

A. Standard Specifications for Public Works Construction ("Greenbook"), most current edition.

1.06 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

1.07 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving existing facilities unless permitted in writing by College Project Manager and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify College Project Manager not less than two weeks in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without College Project Manager's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.

B. Cooperate with District and utility companies in maintaining respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

C. Demolish and completely remove from site existing underground utilities to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations on District's stockpile.

B. Satisfactory Soils: Refer to Standard Specifications for Public Works Construction (SSPWC) "Greenbook" for recommendations.

C. Unsatisfactory Soils: Refer to Standard Specifications for Public Works Construction (SSPWC) “Greenbook” for recommendations. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Backfill and Fill: Satisfactory soil materials.

E. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; with at least 90 percent passing a 1-1/2- inch sieve and not more than 12 percent passing a No. 200 sieve. Must meet Caltrans standards.

F. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve for Class II Base.

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve. Must meet Caltrans standards.

H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

I. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No. 8 sieve.

J. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.02 DRAINAGE FABRIC

A. Non-woven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods.
   1. Grab Tensile Strength: 120 lbf; ASTM D 4632.
   2. Tear Strength: 40 lbf; ASTM D 4533.
   3. Puncture Resistance: 50 lbf; ASTM D 4833.
   4. Water Flow Rate: 150 gpm per sq. ft.; ASTM D 4491.
   5. Apparent Opening Size: No. 50; ASTM D 4751.

2.03 SEPARATION FABRIC

A. Woven geotextile, specifically manufactured for use as a separation geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods.

1. Grab Tensile Strength: 200 lbf; ASTM D 4632.
2. Tear Strength: 75 lbf; ASTM D 4533.
3. Puncture Resistance: 90 lbf; ASTM D 4833.
4. Water Flow Rate: 4 gpm per sq. ft.; ASTM D 4491.
5. Apparent Opening Size: No. 30; ASTM D 4751.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.02 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
   2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.03 EXPLOSIVES

A. Explosives: Do not use explosives.

3.04 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

B. Classified Excavation: Excavation to subgrade elevations classified as earth and rock.
   1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed;

together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
   a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
2. Rock excavation includes removal and disposal of rock.
   a. Do not excavate rock until it has been classified and cross-sectioned by College Project Manager.

3.05 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavation for Mechanical or Electrical Utility Structures: Excavate to required elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended for bearing surface.

3.06 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to required cross sections, elevations, and grades.

B. Excavations shall be in accordance with the Standard Specifications for Public Works Construction (SSPWC) “Greenbook” prepared for this Project.

3.07 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to required gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of pipe a minimum of 36” below finished grade to top of pipe.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise required to meet minimum cover.
   1. Clearance: unless otherwise shown on the drawings, 12 inches on each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
   1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
   2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
   3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Depth: Excavate trenches 6 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
   1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.08 APPROVAL OF SUBGRADE

A. Notify College Project Manager when excavations have reached required subgrade.

B. If College Project Manager determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
   1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.

D. Reconstruct subgrades damaged by rain, accumulated water, or construction activities, as directed by College Project Manager.

3.09 UNAUTHORIZED EXCAVATION

A. Intentionally left blank.

B. Fill unauthorized excavations under other construction or utility pipe as directed by College Project Manager.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations a minimum distance equal to the depth of excavation. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, damp proofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for record documents.
   3. Inspecting and testing underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring and bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Provide 4-inch thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

D. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.
   1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

E. Coordinate backfilling with utilities testing.

F. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

G. Place and compact final backfill of satisfactory soil material to final subgrade.

H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.
   3. Under steps and ramps, use engineered fill.
   4. Under building slabs, use engineered fill.
   5. Under footings and foundations, use engineered fill.

3.14 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill material on surfaces that are muddy, or contain frost or ice.

2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Unless otherwise specified on the drawings or in the soils report, compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
   1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
   2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 95 percent.
   3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 90 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
   3. Stripping. When fills are to be constructed over cultivated or fallowed land, the entire area upon which the fill is to be constructed shall first be cleared of vegetation and then smoothed with a blade grader. When fills are to be constructed over sodded surfaces, the sod shall be stripped to a depth of 2 inches. These smoothed or stripped surfaces shall then be rolled to the specified density required for fill prior to the fill material placement. Dispose of stripped material as waste and completely remove from the Project site.
   4. Conservation of Topsoil. Deposit topsoil in storage piles convenient to the areas which are subsequently to receive application of topsoil. Stockpile topsoil free of roots, stones and other undesirable material as specified in Paragraph 2.1 B above. Keep topsoil, when stored, separate from other excavated materials. Cover storage piles as required to prevent wind blown dust.
   5. Fills. Construct fills at the locations and to the lines and grades indicated on the Drawings. Insure that the completed fill corresponds to the shape of the typical sections shown on the Drawings or meets the requirements of that particular case. Use all approved material removed form the excavation in forming the necessary fill. All fill material shall be free from logs, stumps, sod, weeds, trash or other perishable material, and from all stones having a maximum dimension greater than 6 inches. No stones shall be permitted in the top 12 inches of fills. Place the

material in successive horizontal layers not exceeding 8 inches in loose depth. Use a blade grader to keep fill material spread uniformly. Remove any soft sections, holes or depressions to required grades and refill with material as approved, and shape the entire area to line, grade, and cross section and thoroughly compact as specified. Contractor is responsible for adjustment of the moisture content of the fill material so that the specified compaction can be obtained. The rough grade for the entire Project site or portion thereof shall be approved by College Project Manager before placement of any topsoil.

a. Subgrade Preparation. Subgrades for all drives, parking areas, sidewalks and other structures shall be shaped, dressed, moistened and compacted as specified Test the subgrade for crown, elevation and density in advance of placing pavement.

b. Spreading of Topsoil:. Upon completion of rough grading, spread the stockpiled topsoil for a uniform depth of 6 inches, after settlement, over all areas graded not receiving other surfacing, just prior to the sodding or landscaping operation. Before spreading the topsoil, scarify the graded areas for a depth of 3 inches and repair all settlements and washes.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Finished Grading. Accomplish uniformly smooth grading of all areas covered within the limits of the work, including excavated and filled sections and adjacent transition areas so that the finished surface is smooth, compacted and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from blade-grader operations except as otherwise specified. Finish all swales so as to drain readily.

1. Backfill material shall be the same as specified for fill and shall be placed and compacted as specified for fill unless otherwise noted.

D. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot (3-m) straightedge.

3.17 SUBSURFACE DRAINAGE

A. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6-inch course of filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 12 inches of filter material and wrap in drainage fabric, overlapping sides and ends at least 6 inches.

1. Compact each course of filter material to 90 percent of maximum dry unit weight according to ASTM D 1557.

B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches.

1. Compact each course of filter material to 90 percent of maximum dry density according to ASTM D 1557.
2. Place and compact impervious fill material over drainage backfill to final subgrade.

3.18 BASE COURSES

A. Under pavements and walks, place base course on prepared subgrade and as follows:
   1. Place base course material over subgrade.
   2. Compact base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 90 percent of maximum dry unit weight according to ASTM D 1557.
   3. Shape base to required crown elevations and cross-slope grades.
   4. When thickness of compacted base course is 6 inches or less, place materials in a single layer.
   5. When thickness of compacted base course exceeds 6 inches, place materials in equal layers, with no layer more than 8 inches thick loose material or less than 4 inches thick when compacted.

3.19 DRAINAGE COURSE

A. Under slabs-on-grade, install drainage fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.

B. Under slabs-on-grade, place drainage course on prepared subgrade and as follows, unless otherwise specified by the Geotechnical Engineer:
   1. Compact drainage course to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
   2. When compacted thickness of drainage course is 6 inches or less, place materials in a single layer.
   3. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.20 FIELD QUALITY CONTROL

A. Testing Agency: District will furnish a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design-bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by College Project Manager.

D. Testing agency will test compaction of soils in place according to ASTM D 1556 and ASTM D 2922 as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.

2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by College Project Manager; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

2

A. Transport surplus soil off-site to approved disposal location.

END OF SECTION

SECTION 31 23 33

TRENCHING, BACKFILLING AND COMPACTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall comply with the requirement of this section which includes materials, testing and performance of trench excavation, backfilling and compacting, complete.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 330500 – Installation of Buried Pipe.

B. Section 312300 – Earthwork.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC) “Greenbook” most current edition.

1.04 SUBMITTALS

A. Submit drawings showing excavation and shoring, bracing, or sloping for worker protection in accordance with the Special Provisions Section if required.

B. Submit six (6) copies of a report from a testing laboratory verifying that material conforms to the specified gradations or characteristics for granular material or imported sand.

PART 2 - MATERIALS

2

2.01 PAVEMENT ZONES

A. The pavement zone includes the asphaltic concrete and aggregate base pavement section placed over the trench backfill.

2.02 TRENCH ZONE

A. The trench zone includes the portion of the trench from the top of the pipe zone to the bottom of the street zone in paved areas or to the existing surface in unpaved areas.

2.03 PIPE ZONE

A. The pipe zone shall include the full width of trench from the bottom of the pipe or conduit to a horizontal level above the top of the pipe, as specified below. Where multiple pipes or conduits are placed in the same trench, the pipe zone shall extend from the bottom of the lowest pipes to a horizontal level above the top of the highest or topmost pipe. Thickness of pipe zone above the highest top of pipe shall be 12 inches.

2.04 PIPE BASE

A. The pipe base shall be defined as a layer of material immediately below the bottom of the pipe or conduit and extending over the full trench width in which the pipe is bedded. Thickness of pipe base shall be four inches (4") below the lowest point of the pipe or bell.

2.05 SAND-CEMENT SLURRY BACKFILL

A. Sand-Cement slurry shall consist of one (1) sack of Portland cement per cubic yard of sand and sufficient moisture for workability.

2.06 BACKFILL-PIPE ZONE AND PIPE BASE

A. For ductile iron and PVC pipe the pipe base and pipe zone backfill material shall be imported sand as specified herein.

2.07 IMPORTED OR NATIVE SAND--PIPE ZONE AND PIPE BASE

A. Imported sand shall have a minimum sand equivalent of 30 per State of California, Division of Highways Test "California 217" with 100% passing a 3/8" sieve and not more than 20% passing a 200-mesh sieve.

B. Imported sand used in the pipe zone or for the pipe base shall have the following gradation:

Sieve Size	Percent passing by Weight
3/8 inch	100
No. 4	75 - 100
No. 30	12 - 50
No. 100	5 - 20
No. 200	0 - 15

2.08 SAND-CEMENT SLURRY REFILL MATERIAL FOR FOUNDATION STABILIZATION IN PIPE ZONE

A. Sand-Cement slurry fill in the pipe zone shall not be used unless approved by the College Project Manager.

B. Sand-Cement slurry shall consist of one (1) sack of Portland cement per cubic yard of sand and sufficient moisture for workability.

2.09 WATER FOR COMPACTION

A. Water used in compaction shall have a maximum chloride concentration of 500 mg/l, a maximum sulfate concentration of 500 mg/l, and shall have a pH of 7.0 to 9.0. Water shall be free of acid, alkali or organic materials injurious to the pipe coatings.

PART 3 - EXECUTION

3.01 TESTING FOR COMPACTION

A. Unless otherwise directed by the College Project Manager or the District, the Contractor will test for compaction as described below.

B. Determine the density of soil in place by the sand cone method, ASTM D 1556.

C. Determine the laboratory moisture-density relations of soils per ASTM D 1557.

D. Determine the relative density of cohesionless soils by ASTM D 2049.

E. Sample backfill materials by ASTM D 75.

F. Express "relative compaction" as the ratio, expressed as a percentage; of the in place dry density to the laboratory maximum dry density.

G. Compaction shall be deemed to comply with the specifications when no test falls below the specified relative compaction. The Contractor shall pay all associated costs of any re-testing of work not conforming to the specifications.

3.02 COMPACTION REQUIREMENTS

A. Unless otherwise shown on the Drawings or specified in the soils report relative compaction in pipe zone shall be 95 percent.

3.03 MATERIAL REPLACEMENT

A. Remove and replace any trenching and backfilling material, which does not meet the specifications, at the Contractor's expense.

3.04 SHEETING, SHORING AND BRACING OF TRENCHES (IF REQUIRED)

A. GENERAL

1. Trenches shall have sheeting, shoring and bracing conforming to CAL/OSHA requirements and General Provisions. Lateral pressures for design of trench sheeting, shoring and bracing shall be based on type of soil exposed in the trench, groundwater conditions, surcharge loads adjacent to the trench and type of shoring that will be used in the trench.
2. The banks of trenches, where required to control trench width and protect adjacent structures, shall be sheeted and braced at no additional expense to the Owner. Where shoring, sheeting, bracing or steel strutted trench boxes are necessary, they shall be furnished, placed, maintained and, except as shown or specified otherwise, removed. Where damage is liable to result from the removal of the sheeting, then the sheeting will be required to be left in place and cut off if required or directed.
3. The design, planning, installation and removal, if required, of steel strutted trench boxes or sheeting, shoring, lagging, and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soils below and adjacent to the excavation.

4. The use of horizontal strutting below the barrel of the pipe or the use of the pipe as support for trench bracing will not be permitted. Sheet piling and timbers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loading which might overload the pipe.
5. Following removal of shoring, bracing or steel strutted trench boxes, the space left due to such removal shall be backfilled immediately and the backfill compacted.

3.05 TRENCH EXCAVATION

A. GENERAL
1. Excavation of every description and of whatever substance encountered shall be performed, to the depths required. It may be necessary to increase or decrease the quantity of excavation because of unknown factors. The Engineer reserves the right to change the trench alignment from that indicated by 10 feet horizontally without additional expense to the Owner.

B. TRENCH WIDTHS
1. Maximum trench width in the pipe zone shall be as indicated on the plans. Trench width at the top of the trench will not be limited except where width of excavation would undercut adjacent structures and footings. In such case, width of trench shall be such that there is at least 18 inches between the top edge of the trench and the structure or footing.

C. GRADE
1. Excavate the trench to the depth required with allowance for pipe thickness and for pipe base or special bedding. If the trench is inadvertently excavated below the required grade, refill with imported sand any part of the trench excavated below the grade at no additional cost to the Owner. Place the refilling material over the full width of trench in compacted layers not exceeding six inches (6") to the established grade with allowance for the pipe base or special bedding.

D. EXCAVATION
1. Unless otherwise indicated, excavation shall be open cut. During excavation, material shall be stockpiled in an orderly manner, a distance back from the edges of the excavations specified by the governing safety agency before being wasted as specified. Caution shall be exercised in operating heavy equipment over pipelines. Leaks or breaks caused by the Contractor's operations shall immediately be repaired at no additional expense to the Owner and in a manner acceptable to the Engineer. The banks of excavated areas shall be controlled as is necessary to prevent movement of soil in areas supporting existing foundations, slabs, pole lines, underground power or telephone cables, trees, pipelines or other structures. If, as a result of the excavation or through fault or neglect of the Contractor, the earth or ground under or around such foundations, slabs, pole lines, underground power or telephone cables, trees, pipelines or other structures, slips or is otherwise disturbed, corrective measures shall be taken as directed at no additional expense to the Owner.
2. In the event the maximum allowable trench width is exceeded, the Contractor may be required, depending on the depth of trench, to improve the pipe bedding by utilizing concrete or other bedding materials as necessary to assure that the type

of pipe installed can withstand the loads imposed by the backfill due to the depth of the trench.

3. The bottom of the trench shall be excavated to the depth required with proper allowance for pipe thickness, and for foundation stabilization and special bedding when required. Material containing rocks or cobbles larger than 2 inches in maximum dimension shall not be permitted within 6 inches of the pipe. Material of this type shall be removed from the bottom of the trench and replaced with backfill material. Parts of the trench excavated below grade shall be corrected with backfill as specified. The depth of trenches shall be as indicated.

3.06 DEWATERING

A. Provide and maintain means and devices to remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipe-laying, during the laying of the pipe, and until the backfill at the pipe zone has been completed. These provisions shall apply during 24 hours per day, seven days a week. Dispose of the water in a manner to prevent damage to adjacent property. Do not drain trench water through the pipeline under construction. Do not allow groundwater to rise around the pipe until jointing compound has set hard.

B. Contractor shall notify the College Project Manager 48 hours prior to commencement of dewatering.

3.07 LOCATION OF EXCAVATED MATERIAL

A. During trench excavation, place the excavated material only within the working area. Do not obstruct any roadways or streets. Conform to federal, state and local regulations governing the safe loading of trenches with excavated material.

3.08 TRENCH BACKFILLING

A. Backfill per the detailed piping specification for the pipe and per the following.

B. Place the specified thickness of pipe base material over the full width of trench. Grade the top of the pipe base ahead of the pipe-laying to provide firm, uniform support along the full length of pipe.

C. After pipe has been bedded, place pipe zone material simultaneously on both sides of the pipe, keeping the level of backfill the same on each side. Carefully place the material around the pipe so that the pipe barrel is completely supported and that no voids or uncompacted areas are left beneath the pipe. Use particular care in placing material on the underside of the pipe to prevent lateral movement during subsequent backfilling.

D. No mechanical compaction of material placed within 12 inches of the outer surface of the pipe will be allowed.

E. Push the backfill material carefully onto the backfill previously placed in the pipe zone. Do not permit free fall of the material until at least two feet (2') of cover is provided over the top of the pipe. Do not drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe.

3.09 BACKFILL COMPACTION

A. Compact per the detailed specification.

B. Compact trench backfill to the specified relative compaction. Compact by using mechanical compaction or hand tamping. Consolidation by jetting or flooding will be permitted at the Geotechnical Engineer's discretion. Maximum backfill lifts shall not exceed eight inches (8").

3.10 IMPORT OR EXPORT OF BACKFILL MATERIAL

A. Excess excavation soil material shall be removed and disposed of by the Contractor off the project site at the Contract's expense. Excess soil material shall be disposed of in accordance with local regulations.

B. Contractor shall be responsible, at no additional cost to the Owner, to import any required additional backfill material necessary to return all grades to the grade encountered at the beginning of construction or as shown on the contract Drawings.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCING AND GATES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section includes Chain link fencing and gates as indicated.

B. Related Sections:
1. Section 31 23 33: Trenching, Backfilling, and Compaction
2. Section 32 13 13: Sitework Concrete

1.02 REFERENCE STANDARDS

A. Placeholder

1.03 SUBMITTALS

A. Shop Drawings: 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.

1.04 QUALITY ASSURANCE

A. Comply with Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS

2.01 MATERIALS

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:

1.	Portland Cement	1 part
2.	Fine Aggregate	2 parts
3.	Coarse Aggregate (1/4” to 1-1/2”)	4 parts
4.	Water	7 ½ gallons max. per sack of cement

B. Chain Link Fence Fabric, Posts, Rails, and Gates: Standard galvanized.

C. Chain Link Fence Fabric: Conforming to ASTM A 392, Class C2 zinc coating, 2.00 ounces minimum per square foot of vinyl-coated wire surface, hot-dipped galvanized after weaving, and top and bottom edges knuckled.
1. Fabric for perimeter fencing and interior fencing shall be 9 gauge woven wire; with one (1) inch mesh, unless otherwise specified.

2. Installed fence fabric shall be free from barbs or other projections. Installed fence fabric with such defects will be deemed defective Work

D. Posts, Top Rails, Brace Rails and Gate Frames: Standard weight, galvanized, welded or seamless steel pipe conforming to ASTM A 53, 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.

E. Schedule of Posts and Footings: 2

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
Line Posts	Up to 6'-0"	2	2.375	2.65	See Details	See Details
Terminal, Corner, Angle & Pull Posts	Up to 8'-0"	2-1/2	2.875	5.79	12	36
Pedestrian Gate Posts	Up to 8'-0"	2-1/2	2.875	5.79	See Details	
Gate Frames	Up to 8'-0"	1-1/2	1.900	2.72	N/A	N/A

F. Post Caps: Malleable iron, ASTM A 47, Grade 32510, 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.

G. Eye Tops: Malleable iron, ASTM A 47, Grade 32510, designed to fit over line posts, and for through passage of top rail.

H. Expansion Sleeve Couplings for Top Rails: Steel, six (6) inches long, designed to fit tightly on inside of rail, fitted with raised center.

I. Rail Ends for Top Rails and Brace Rails: Malleable iron, ASTM A 47, Grade 32510, with holes to receive 3/8-inch bolts for securing to rail end bands.

J. Tension Bands and Bands for Securing Rail Ends: Mild steel flats, at least 11 gage x one (1) inch, tension bands in gates shall be 11 gage x one (1) inch. Bolts for use with tension bands and rail end bands shall be 3/8-inch x 1-1/2-inches.

K. Tension Bars: Mild steel flats at least 3/16-inch x ¾-inch.

L. Tension Wire for Installation at Bottom of Fabric: 6 gauge 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.

M. 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 4-1/2-inches of take-up.

N. Tie Wire: Aluminum ties 6 gauge for fastening fabric to posts, top rails and brace rails. At bottom tension wire 9 gauge galvanized hog rings shall be installed.

O. 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 A 47 Standard Specification for Ferritic Malleable Iron Castings.

PART 3 - EXECUTION

3.01 SWING GATES

A. Gates that are part of the accessible route shall meet all the requirements of an accessible door in compliance with CBC 11B-404.

B. Gate Frames: 1 ½ inch diameter steel pipe, welded corners, hot dip galvanized after fabrication.

C. Sizes: As indicated on drawings, minimum width of gates shall not be less than 36” (clearance of opening width shall not be less than 32 inches).

D. Hardware: Heavy-duty, galvanized ferrous metal industrial quality as manufactured by Master-Halco/Anchor Fence Inc., Baltimore, MD. Von Duprin, Adams Rite, Sargent, Trimco or equal as approved and in accordance with Division 01, General Requirements for substitutions.

E. Hinges: Structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180 degrees as indicated on drawings
   1. Latch: Fork type latch capable of retaining gate in closed position, except gates with exit devices (panic hardware); Master-Halco, Series 16000 or approved equal.
   2. Locking: Provide padlock capability on non-pedestrian gates only. Do not install padlock capability on Exit Gates, gates on Path of Travel with Exit Devices and other pedestrian gates.

3.02 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 eight (8) feet apart measured from center to center of posts. 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 five (5) percent or more in grade of fencing, and at the beginning and end of curved fence sections.

D. Install 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 3-1/2-inches; for single leaf gates, net opening shall be gate size plus 2-1/2-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. Provide a transom rail and fabric at top of pedestrian gate openings. Install transom rail six (6) feet – eight (8) inches above high point of grade at gate opening. Ends of transom rails shall be pinned or riveted to rail end fittings with ¼-inch mild steel rivets. Pin or rivet must go through rail and peen. Welding on rail ends is not permitted.

H. Install bottom tension wire a minimum of three (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 (3) times around wire. At turnbuckles, wire through eye and tightly twist end at least three (3) times around wire. Cut tail of bottom wire flush.

I. Install fence fabric on outward facing side of posts. Install fence fabric with top edge projecting above top rail of fence.

J. 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.

K. 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

L. Bands and Ties: Install bands and ties in accordance with following schedule:

1. 15 bands on 16 feet fence	16 ties on 16 feet fence
1. 11 bands on 12 feet fence	12 ties on 12 feet fence
2. 7 bands on 8 feet fence	7 ties on 8 feet fence
3. 6 bands on 6 feet fence	6 ties on 6 feet fence
4. 4 bands on 4 feet fence	4 ties on 4 feet fence

M. Fasten fabric to line posts with wire ties spaced not more than 16-inches apart. Where 6 gauge aluminum ties are furnished, hook the tie at both ends. Installation of hooked ties with links is not permitted.

N. 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 two (2) fabrics are furnished, lap the fabrics one mesh at mid-rail and tie both fabrics with 9 gauge wire or 6 gauge aluminum ties to mid-rails.

O. Grind all field welds smooth, clean off flux and spatter, damaged galvanizing removed, burrs and projections ground off, properly prepared, then heavily coated with “Rust Bullet” as manufactured by Poliflex USA or equal product approved by Owner’s Office of Environmental Health and Safety. Install coating in accordance with written recommendations of manufacturer.

P. 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 three (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 galvanized fabricated parts after welding, or finish weld as specified for field welds

Q. Fencing Adjustments:
   1. Where the finish grade is raised six (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-inch above finish grade.
   2. Where the finished pavement is lowered; six (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-inch above finish grade.
   3. Post footings and fabrics that require readjustment after installation shall be entirely replaced.

R. Provide gates of the sizes indicated on Drawings. Allow clearance on gates of 1-1/2 inches at bottom and one (1) 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.

S. 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.

3.03 FIELD QUALITY CONTROL

A. Completed fencing shall form continuous units between points indicated with required parts, accessories, and fittings provided and installed. Clean all 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.

3.04 CLEANING

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.05 PROTECTION OF FINISHED WORK

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 32 84 00

IRRIGATION

PART 1 - GENERAL

A. Materials, equipment and services required to install complete automatic landscape irrigation system as indicated on Drawings.

B. Irrigation components and design shall comply with current Chaffey College Campus Design Standards.

1.2 REFERENCE

A. ASTM A 126 - Gray Iron Castings For valves, Flanges and Fittings

B. ASTM A 536 – Ductile Iron Castings

C. ASTM B 42 – Seamless Copper Pipe

D. ASTM D 1784 - Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds

E. ASTM D 1785 - PVC Plastic Pipe, Schedules 40, 80, and Class 200

F. ASTM D 2464 - Threaded Poly PVC Plastic Pipe Fittings, Schedule 80

G. ASTM D 2466 - PVC Plastic Pipe Fittings, Schedule 40

H. ASTM D 2564 - Solvent Cements for PVC Plastic Piping Systems

I. ASTM F 437 - Threaded CPVC Plastic Pipe Fittings, Schedule 80

J. ASTM F 438 - Socket-Type CPVC Plastic Pipe Fittings, Schedule 40

K. ASTM F 441 - CPVC Plastic Pipe, Schedules 40 and 80 and Class 200

L. ASTM F 477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe

M. ASTM F 493 - Solvent Cements for CPVC Plastic Pipe and Fittings

N. NEMA 250 - Enclosures for Electrical Equipment

O. NEMA 250 - Enclosures for Electrical Equipment

1.3 SUBMITTALS

A. In accordance with Section 01330 - Administrative Requirements for Submittal Procedures.

B. List of Materials:

1. Submit a complete list of materials prior to commencing work. List of materials shall include the name of manufacturer, model number, and description of each item in-tended for use in the installation.
2. Although manufacturer and other information may differ, the following is a guide to the proper format for submittal:

Item	Description	Manufacturer	Model No.
1)	Rotor Type Popup Sprinkler	Rain Bird	T-Bird Series
2)	Field Satellite	Rain Bird	ESP Series
3)	Manual Gate Valve	Nibco	T-113
4)	Etc.	Etc.	Etc.

3. Irrigation submittal shall be specific and complete. All items shall be listed, including solvent, primer, wire, wire connectors, valve boxes, and other items needed to complete work.
4. Equipment or materials furnished without the prior approval of Owner may be rejected and required to be removed at Contractor’s expense.
5. Approval of any item, alternative, or substitute indicates only that the product or products meet the requirements of Drawings and Specifications based on information submitted.
6. Submit operating and maintenance data of equipment.

C. Project Record Documents: Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1. Provide and keep up to date a complete red-lined record set of drawings (blueline Ozalid type prints) which shall be corrected daily. Prints for this purpose may be obtained from Owner at cost. Document every change from the original Drawings and the exact installed locations, sizes, and types of equipment.
2. Red-lined drawings shall be kept on job site and shall be used only as a record set. The record drawings shall always be available for review by Owner. Submit copies of the red-lined record drawings to Owner for review each month.
3. Red-lined drawings shall serve as record for the progress of work completed and shall be used by the Owner as a basis for measurement and payment. Should record drawings not be available for review or not be up to date at the time of review, it will be assumed no work has been completed.
4. Two weeks prior to date of substantial Completion for work under this Section, transfer all information from the redlined record set of drawings to AutoCAD electronic files. Prepare drawings in accord with Owner's AutoCAD standards. An electronic file of base drawing will be provided by Owner. Provide drawing plot for Owner’s review and approval.
5. As-built locations shall be dimensioned from two permanent points of reference, such as building corners, curbs, hardscape edges, roadways, or similar elements. Offsets should be taken at 90-degree angles from reference points whenever possible.

a. Provide the location of the following items:
   1) Pressure main line routing. Include all changes in direction
   2) Point of connection to the existing water supply lines
   3) Remote control valves
   4) Quick coupling valves and washdown valves
   5) Gate valves (manual and automatic)
   6) Communication and flow sensor cable routing
   7) Flow sensors
   8) Point of connection to electrical power service
   9) Diagrammatic routing of irrigation control wire
   10) Controller location
   11) Irrigation electrical pull box locations
   12) Other related equipment, as directed by Owner

b. Indicate elevations for all components where site conditions require installation deeper than 36 inches.

D. Controller Charts:

1. Submit As-built drawings for review and approval by Owner prior to preparation of controller charts.
2. Provide one controller chart for each field satellite supplied.
3. Controller charts shall be prepared in AutoCAD. Provide hard copy plots of controller charts and AutoCAD electronic files on flash drive. Provide preliminary plot for Owner approval prior to final submittal.
4. The controller chart shall indicate the area controlled by each respective controller and shall be plotted at a scale and size approved by Owner. Chart shall depict each controller station and area of coverage in separate background colors.
5. The controller charts shall be completed and approved prior to the final acceptance of system.

1.4 CONSTRUCTION DRAWINGS

A. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, sleeves, etc. which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of their work and plan their work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, and architectural features.

B. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications. When an item is shown on the plans but not shown on the specifications or vice versa, it shall be deemed to be as shown on both. The Landscape Architect shall have final authority for clarification.

C. The Contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in engineering. Such

obstructions or differences should be brought to the attention of the Landscape Architect as soon as detected. In the event this notification is not performed, the Irrigation Contractor shall assume full responsibility for any revision necessary.

1.5 PROJECT CONDITIONS

A. Coordinate with other trades for underground improvements, location and planting of specimen trees, and other planting as applicable. Verify location of all planting requiring excavations 24 inches in diameter and larger with Owner prior to layout of main lines.

B. Provide temporary irrigation at all times to properly maintain plant materials.

C. Existing Irrigation Systems:

1. The existing computer control system shall be maintained in uninterrupted operation for the duration of the work.
2. All existing irrigation valves and irrigation systems adjacent to the work shall be protected in-place and maintained in operation. Any required disconnection or interruption in existing irrigation shall be coordinated with the Owner in advance of work.

1.6 PRE-INSTALLATION CONFERENCE

A. At least two (2) weeks prior to the commencement of work, Contractor shall arrange a pre-installation conference with the Owner. This meeting shall include all parties responsible for installation, scheduling and testing of the finish work under this section.

B. Review methods and procedures related to the work of this Section, including, but not necessarily limited to the following:

1. Products and system requirements
2. Review of required submittals
3. Review of required details
4. Schedule and sequencing of work
5. Coordination with other trades and existing site conditions
6. Forecasted weather and procedures for coping with unfavorable conditions
7. Required inspections, reviews and procedures for approvals

C. Contractor shall document in writing the conference including all decisions, directions and agreements reached. Furnish copies of record to all parties in attendance.

1.7 COORDINATION

A. Contractor shall give other contractors advance notice to allow them sufficient time to perform their portion of work.

1.8 QUALITY ASSURANCE

A. Coordinate work of this Section with other underground utilities and trades responsible for their installation.

B. Product Handling in accord with Section 01660 – Product Storage and Handling Requirements

C. Worker Qualifications:

1. On-site field superintendent shall have not less than 5 yrs. of continuous experience in the installation of commercial computer-controlled irrigation systems.
2. Documented completion of central control system manufacturer's 'Installation Certification Program for Computer Controlled Irrigation Systems.'
3. Documentation of 5 successfully completed commercial computer-controlled irrigation system installations. Provide project name, location, address, and telephone number of contact person for information regarding the completed work.

D. Tests and Inspections:

1. Do not conceal any work until all required tests and inspections have been completed.
2. Conduct the following tests, inspections and conference with Owner. Provide advanced notification of each according to the times indicated:
   a. Pre-installation conference: 7 days
   b. System layout: 24 hours
   c. Hydrostatic testing of pressure main line and non-pressure lateral lines installed under paving: 24 hours
   d. Coverage tests: 24 hours
   e. Final inspections: 48 hours
3. During final inspection, provide two-way radios and sufficient personnel to provide constant communication between inspection areas and the controller.
4. Hydrostatic Tests:
   a. Furnish force pump and all equipment required to perform hydrostatic testing.
   b. Center load backfill over pipes, leaving all joints exposed until the installation has been inspected, tested, and approved by Owner.
   c. Except for ball valves installed upstream of control valves, all testing shall be completed prior to the installation of all other valves and valve assemblies.
   d. Perform hydrostatic tests in presence of Owner. Maintain 150 psi pressure in the lines for a period of not less than 4 hours. If leaks develop, remake joints and repeat tests until the entire system has proven watertight.
5. Coverage Test:
   a. Upon completion of the sprinkler system and prior to planting of shrubs, ground cover or turf, perform a coverage test in presence of Owner to determine that irrigation coverage for all planting areas is complete and adequate.
   b. Furnish materials and perform work required to correct any inadequacies of coverage. Reschedule and perform additional coverage test with Owner for approval.

E. Final Acceptance

1. Prior to final approval of work, all of the following requirements shall be met:
   a. Landscape irrigation system completed and approved by Owner.
   b. Coverage tests completed and approved by Owner.
   c. Punch list items completed and approved by Owner.
   d. As-built drawings completed and approved by Owner.
2. Maintain irrigation system and sufficient watering schedule until all conditions of approval have been completed.
3. Contracted irrigation maintenance period shall begin upon Owner's final acceptance.

1.9 ADDITIONAL MATERIALS

A. Furnish the following extra system components prior to Final Approval:

1. Six sprinkler bodies of each type used on project.
2. Six sprinkler nozzles of each type used on project.
3. Six pressure compensating nozzle screens of each type used on project.
4. Two wrenches for each type rotor type sprinkler head installed on project.
5. Two valve box keys.
6. One valve key for manual valves.
7. Two quick coupler key assemblies, for every (5) washdown valves installed (or fraction there-of). Key assembly shall include; one Buckner QB7DK15 key, one Nibco T-580 1 in. ball valve, one 1 in. x 2 in. brass nipple, and one Rain Bird SH-1 hose swivel.

1.10 WARRANTY

A. Submit warranty documents as part of project closeout.

B. Warranty the entire landscape irrigation system to give satisfactory service, including all equipment and materials for a period of one (1) year from the date of Final Acceptance.

C. Warranty the temporary landscape irrigation system to give satisfactory service for a period of 6 months from the date of acceptance by Owner.

D. Should any problems develop within the warranty period due to inferior and faulty materials or workmanship, correct problems to Owner's satisfaction at no additional cost.

E. Any damages or re-work required of the landscape or hardscape due to repairs of the irrigation system shall be completed to Owner's satisfaction at no additional cost.

F. Owner reserves the right to make temporary repairs, as necessary, to keep the landscape irrigation system in an operating condition. Exercising this right does not in any way relieve the contractor of any responsibilities under the terms of the warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Plastic Pipe and Fittings:

1. All buried irrigation water pipe, both pressure mainline and lateral lines, shall be purple PVC pipe.
2. Wash-down main lines shall be purple PVC pipe.
3. Pipe shall be marked with Manufacturer's name, nominal pipe size, schedule or class, pressure rating in psi, and date of extrusion.
4. Fittings shall bear manufacturer's name or trademark, material designation, size, and applicable I.P.S. schedule:

    a. Glued socket type, for pipe sizes 3 in. and smaller; Schedule 40, PVC plastic; Grade I, ASTM D2466, Type I
        1) Solvent cement: ASTM D2546, for PVC pipe and fittings.
    b. Threaded type, for pipe sizes 3 in. and smaller; Schedule 80, PVC plastic; threaded type; Grade I, ASTM D2464, and ASTM F437
    c. Bell-end, sizes 4 in. and larger; Ductile iron, grade 70-55-05 in accord with ASTM A536, having deep bell push-on joints with gaskets meeting ASTM F477
        1) Harco ‘Deep Bell’ by the Harrington Corp. of Lynchburg, VA. (804) 845-7094, or Owner-approved equivalent.

B. Copper Pipe and Fittings:

1. Type K, hard tempered pipe, ASTM B42, with solder type fittings.
    a. Solder: ASTM B32, with suitable flux.

C. Brass Pipe Fittings:

1. 125 lb. class cast bronze pipe, ASTM B62, with threaded cast bronze fittings.

D. Thrust Blocks:

1. Standard concrete mix in accord with ASTM C 150, ASTM C 33, and ASTM C 94 with a compressive strength of 2000 psi. after 28 days

E. Valve Boxes:

1. For all valves, boxes to be as specified on drawings, or owner-approved equivalent.

F. Control Wire Requirements:

1. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply lines wherever possible leaving 12 inches between pipes. Wire shall be placed in Schedule 40 PVC gray conduit.
    a. Where wire will not be run in same trench as mainline, install wire in Schedule 40 PVC gray conduit a minimum of 18 in. below finished grade.

2. An expansion curl shall be provided within 3 ft. of each wire connection. Expansion curl shall be of enough length at each splice connection at each electric control valve, so that in case of repair, the valve bonnet may be brought to the surface without disconnecting the control wires. Control wires shall be laid loosely in trench without stress or stretching wire conductors.
3. Conventional Controller:
   a. Make wire splices using 3M DBY-6, DBR-6 connectors, UL-listed. Make an expansion loop of 36 in. at each directional turn.
   b. Use a continuous wire between controller and remote-control valves. Do not use wire splices without prior approval by Owner and/or owner representative. Install each approved splice in valve box.
   c. Color of all common wires shall be white and white with a yellow stripe as noted below. When more than one wire is placed in the same trench each wire shall have a different color. Provide separate common wire for each field satellite supplied.
   d. Color code all control wires as follows:
      1) Common (1) – White
      2) Common (2) -White with Yellow stripe
      3) Spare –Red
      4) Station No. 1 – Black
      5) Station No. 2 – Blue
      6) Station No. 3 – Brown
      7) Station No. 4 – Gray
      8) Station No. 5 – Green
      9) Station No. 6 – Orange
      10) Station No. 7 – Pink
      11) Station No. 8 – Purple
      12) Station No. 9 – Yellow
      13) Station No. 10 – Black with White stripe
      14) Station No. 11 – Blue with White stripe
      15) Station No. 12 – Brown with White stripe
      16) Station No. 13 – Gray with White stripe
      17) Station No. 14 – Green with White stripe
      18) Station No. 15 – Orange with White stripe
      Station No. 21- Gray with Black stripe
      Station No. 22- Green with Black stripe
      Station No. 23- Orange with Black stripe
      Station No. 24- Pink with Black stripe
      Station No. 25- Purple with Black stripe
      Station No. 26- Red with Black stripe
      Station No. 27- Yellow with Black stripe
      Station No. 28- White with Black stripe
      Station No. 29- Black with Red stripe
      Station No. 30- Blue with Red stripe
      Station No. 31- Brown with Red stripe
      Station No. 32- Gray with Red stripe
      Station No. 33- Green with Red stripe
      Station No. 34- Orange with Red stripe
      Station No. 35- Pink with Red stripe

19) Station No. 16 – Pink with White stripe Station No.36-Purple with Red stripe
20) Station No. 17 – Purple with White stripe Station No.37-Yellow with Red stripe
21) Station No. 18 – Red with White stripe Station No. 38- Black with Green stripe
22) Station No. 19 – Blue with Black stripe Station No. 39- Blue with Green stripe
23) Station No. 20 – Brown with Black stripe Station No. 40- Brown with Green stripe

4. 2-Wire Controller:
   a. Use a two-wire path to connect from the controller to a single station or sensor decoder. Each individual remote-control valve, master valve, and flow sensor shall require a decoder compatible with the specified controller.
   b. The decoders may be wired in sequence over any combination of the two-wire paths dependent on the controller capabilities and/or additional expansions models. Each path may extend up to 10,000 ft. to the end of the wire run over 14 AWG wire, or 15,000 ft. over 12 AWG wire.
   c. The wire paths shall be twisted pair, solid-core, color-coded red/blue pairs, enclosed in a PE sleeve. Multiple colors should be used for in-ground identification in areas where multiple 2-wire paths are being ran through the same trench. Hunter Industries Model ID1xxx for 14 AWG conductors, or Model ID2xxx for 12 AWG.
   d. The two-wire paths may be spliced, or “teed”, permitting extensions of the path in multiple directions. In general, the distance from the controller to the end of any one end of a “tee” or wire run shall not exceed the maximum for the gauge of wire, even if the total of all wire exceeds that number. For example, a path comprised of 14 AWG wire, rated for 10,000 ft., could extend 5000 ft. to a “tee” splice, and each arm of the tee could extend an additional 5000 ft. The total wire connected would equal 15,000 ft., but the distance from the controller, to the end of each run, would be 10,000ft. or less, meeting the specification. All wire splices must be made in a valve box with 3M DBR-6 or equal direct-burial waterproof connectors.
   e. Decoder output to solenoid connections shall be made with 3M DBY waterproof, strain-relieving connectors, or exact equals. No substitution of wire or wire connector specifications is permissible. All connections, tees, and splices shall be positioned in valve boxes for future location and service.

G. Sensor Wire

1. The flow sensor wire shall be manufactured by Imperial, model #IFSW. No field splices allowed between flow sensor and controller.

H. Conduit for Wires:

1. All control wires installed under paving shall be installed within a PVC Schedule 40 conduit. Install flow sensor cable and communication cables within a PVC Schedule 40 conduit. Conduit Size as indicated on the Drawings.
2. Use separate conduit for each type of wire or cable

I. Copper Pipe and Fittings:

1. Copper pipe: Type K, hard tempered ASTM B88.
2. Fittings: Wrought copper, solder joint type, in accord with ASTM B828-00.
3. Solder: Make up solder joints with appropriate paste flux and solder with 95/5 solder, unless otherwise specified.

J. Valve Identification Tags:

1. Each electric control valve tag shall include the controller ID and station number.
2. Use one maxi size tag for electric control valve. Each tag shall provide valve ID information.
3. Special order tags from T. Christy Enterprises, 403 West Brenna Lane, Orange, CA 92667. Tel: (714) 771-4142, Fax: (714) 771-3029.

2.2 EQUIPMENT

1. All equipment to be as specified on drawings.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Layout of irrigation pipe and equipment indicated on Drawings is diagrammatic. Actual locations are contingent upon site conditions and integration with other underground utilities.

B. Verify dimensions, grades and points of connection in field prior to commencement of work.

C. Do not proceed with installation when it is apparent that obstructions, grade differences or conflicts in the Drawings exist. Bring all such conflicts or discrepancies are to the immediate attention of Owner for clarification.

D. Obtain and pay all plumbing permits and inspections required by governing agencies.

3.2 TEMPORARY IRRIGATION

A. Provide a temporary irrigation system for all palm trees and all boxed trees 24 in. and larger installed under this contract. This system is to ensure that installed trees will be automatically irrigated during the plant establishment period.

B. The temporary system shall be designed by a qualified irrigation design professional that is experienced with drip and low flow irrigation systems.

1. Submit for Owner approval, prior to commencing with work, schematic drawings showing intended drip irrigation design with all pertinent information for temporary water connections, equipment and installation.

C. System to be installed and operational prior to tree planting, regardless of the availability of a permanent water connection. If permanent irrigation water is not available at the time the system is installed, provide a temporary water connection until a permanent connection can be made.

D. All pipe and tubing for supplemental irrigation shall be buried and sleeved under construction or access roads, at a proper depth to prevent damage. Protect pipe during entire planting process and repair damage to landscape caused by leaking or breakage of lines. Pipe or tubing, not in a hazardous area, can be installed on-grade. Pipe installed as a part of temporary irrigation shall not be re-used as any part of the permanent landscape irrigation system.

E. The system should be designed and installed at 90% capacity in the event additional plant materials or spray stakes are required.

F. Use the following table to determine the required quantity of emitters or spray stakes; all measurements given reflect the longest dimensions

1. 1 spray stake/emitter for all rootballs up to 2 feet
2. 2 spray stakes/emitters for all rootballs up to 4 feet
3. 3 spray stakes/emitters for all rootballs up to 6 feet
4. 4 spray stakes/emitters for all rootballs up to 8 feet

G. Flow rates should be calculated using 0.5 GPM per emitter.

H. Upon completion of the permanent irrigation system, remove battery operated controllers and valves and connect the temporary system to the designated permanent control valves as shown on the Drawings. Battery operated controls to be returned to Owner.

3.3 EXCAVATION AND BACKFILLING

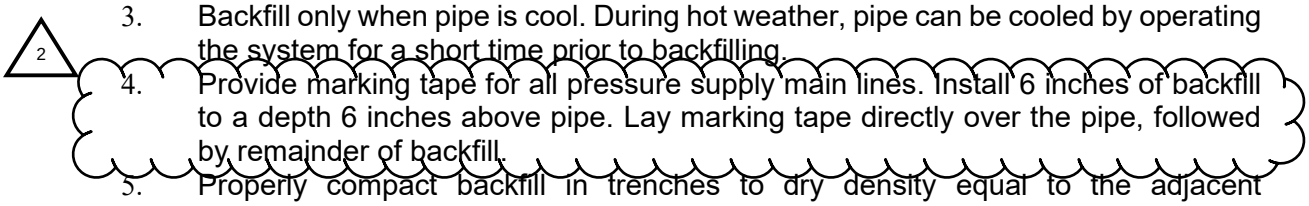
A. Trenching:
1. Lay-out system using an approved staking method.
2. Coordinate routing of mainline piping and trenching with specimen tree locations.
   a. Planting locations shall take precedence over sprinkler and piping locations.
   b. Notify Owner of any major deviations from original layout.
3. Excavate trenches with straight and vertical sides. Provide continuous support for pipe on bottom of trenches. Lay pipe to uniform grade.
   a. Maintain 1 inch minimum clearance between lines which cross at 45-degree to 90 degree angles.
   b. Maintain 6 inch minimum clearance between sprinkler lines and between lines of other trades. Do not install sprinkler lines directly above any another pipes or utilities.
4. Where irrigation lines occur under paving, depth of coverage shall be measured from the bottom of paving material.
   a. Provide minimum cover of 36 inches over all pressure supply main lines 6 in. and larger. Maximum cover shall be 48 inches unless otherwise approved by Owner.

b. Provide minimum cover of 24 inches over all pressure supply main lines 4 inches and larger. Maximum cover shall be 48 inches unless otherwise approved by Owner.
c. Provide minimum cover of 12 inches over non-pressure lateral lines. Maximum cover shall be 18 inches unless otherwise approved by Owner.

5. Install, under mainline, one continuous No. 14 AWG UF tracer wire in all locations where control wires are not installed in same trench as mainline. Tracer wire shall be black with white stripe.

B. Backfilling:

1. Backfill and compaction: In accord with Section 31 23 33.
2. Initial backfill over all pipe shall be clean, fine granular material.
3. Backfill only when pipe is cool. During hot weather, pipe can be cooled by operating the system for a short time prior to backfilling.



4. Provide marking tape for all pressure supply main lines. Install 6 inches of backfill to a depth 6 inches above pipe. Lay marking tape directly over the pipe, followed by remainder of backfill.
5. Properly compact backfill in trenches to dry density equal to the adjacent undisturbed soil, and conform to adjacent grades without dips, sunken areas, humps, or other irregularities.
6. Restore grades and repair any damage where settlement may occur.

3.4 INSTALLATION

A. Point of Connection:

1. Connections to water source shall be at approximate location indicated on Drawings. Make any minor changes caused by actual site conditions without additional cost to Owner.

B. Valve Assemblies:

1. Install and connect all assemblies in accord with Drawings.
2. Do not install multiple assemblies on plastic lines. Provide each assembly with its own outlet. When used, the pressure relief valve shall be the last assembly.
3. All threaded fittings shall be assembled using Teflon tape applied to the male threads.
4. When specified, install backflow assemblies in shrub areas at the minimum height indicated on Drawings.
5. Locations for all equipment, as indicated on Drawings, such as point of connection, CCU's, field satellites and valves are approximate.
   a. Stake out all equipment locations for review and obtain Owner's approval prior to installation.
   b. Minor modifications to layout of equipment shall be provided by at no additional costs to Owner.
   c. Failure to obtain Owner's approval prior to installation may require Contractor to relocate and re-work installation at no additional costs to Owner.

C. Plastic Pipe and Fittings:

1. Install and connect plastic pipe in accord with manufacturer's recommendations.
2. Prepare all welded joints with approved primer prior to applying solvent.
   a. Allow welded joints at least 15 min. set-up/curing time before moving or handling.
   b. Partially center load pipe in trenches to prevent movement or shifting when water pressure is applied.
   c. Do not permit water in pipe for a minimum of 4 hrs. after applying solvent welds.
   d. When the temperature is above 80°F, allow solvent weld joints at least 24 hr. curing time before water is introduced under pressure.
   e. Suspended all solvent welding if air temperature falls below 40°F. Pipe and fittings installed at temperatures below 40°F shall be removed and replaced at no cost to Owner.
3. Installing pipe under existing pavement:
   a. Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. Hydraulic driving will not be permitted under asphalt paving.
   b. Secure permission from Owner prior to cutting or breaking any existing pavement. Repairs or replacement to existing paving shall be approved and completed to the satisfaction of the Owner and shall be installed and finished at no additional cost.

D. Conduit:

1. Install conduit where control wires pass through or under walks, walls and paving. Conduits shall be of adequate size to accommodate retrieval of wires for repair and shall extend 18 in. beyond edges of walls and pavement.

E. Sleeves:

1. Install sleeves for pipes passing through or under walks, walls and paving as indicated on Drawings. Sleeving shall be of adequate size to accommodate retrieval of wiring or piping for repair and shall extend 18 in. beyond edges of paving or other construction.
2. Field verify the location, size and depth of existing sleeves where so noted on Drawings. Notify owner of any discrepancies prior to the start of installation.

F. Wire:

1. Make underground wire connections to electric remote control valves with UL-listed 3M ‘DBY-6’ or ‘DBR-6’ connectors (depending on wire size).
2. Install all control wire in conduit.

G. Gate Valves:

1. Install in accord with Drawings.
2. Check and tighten valve bonnet packing before backfilling.

H. Electric Control Valves:

1. Install in accord with Drawings.
2. Install at sufficient depth to provide not more than 6 in. and not less than 4 in. cover from top of valve to finish grade.
3. Install valves in a plumb position with 24 in. minimum maintenance clearance from other equipment.
4. Electric control valves shall be connected to field satellites in numerical sequence as indicated on Drawings.

I. Quick Coupler Valves/Washdown Valves:

1. Install in accord with Drawings.

J. Sprinkler Heads:

1. Install in a plumb position, perpendicular to finish grade, at intervals not to exceed maximum spacing indicated on drawings.
2. Install heads 1/2 in. above finish grade along curbs, walks, paving, and similar areas.
3. Lay out sprinkler heads and make all minor adjustments required due to differences between site conditions and Drawings. All such deviations in layout shall be within the intent of the original Drawings, and without additional cost to Owner. Routing and layout of all piping shall be approved by Owner prior to installation.
4. After all permanent sprinkler pipe lines and risers are in place and prior to installation of sprinkler nozzles, open control valves and flush out the system with a full head of water.
5. Install nozzles of the required size and pattern for the area of coverage. Install pressure compensating screens per manufacturers recommendations.

K. Field Controller Assemblies:

1. Coordinate with Owner for final controller location.
2. Secure the following services from the controller manufacture:
   a. On-site meeting to review system operation and ensure that all personnel understand system installation techniques.
   b. On-site technical assistance during installation period when requested by Contractor or Owner.
   c. Testing of grounding system.
   d. Hook-up of communication and sensor wires within assemblies.
   e. Continuity and resistance tests on communication wires.
   f. Program decoders.
   g. Verify system flow range and calibrate pulse transmitter.
   h. Test system components for proper operation.
   i. Certification that equipment conforms to and is installed in accord with Drawings, Specifications, and manufacturers' recommendations.

L. Flow Meter and Flow Sensor:

1. Install in accord with manufacturer's instructions and as indicated on Drawings.
2. Provide separate flow sensor cable from each flow sensor to its' respective pulse decoder. Run all cables in PVC Sch 40 conduit.

a. Maximum of three (3) cables from the same point of connection may be installed within the same conduit. Cables from different points of connection are not permitted within the same conduit.
b. Control and common wires for automatic gate valve, upstream of flow sensor, shall be installed within flow sensor cable conduit.

M. Grounding:

1. Grounding Equipment:
   a. Grounding Rods to be 5/8 inch x 10 foot copper clad, UL Listed.
   b. Grounding plates to be 4 inches x 96 inches x 0.06 inch copper alloy with integral connection of 25 feet of #6 AWG bare, solid copper wire, UL Listed conforming to the minimum requirements of Section 250 of the National Electric code. Connection of the wire to plate shall be performed by the plate manufacturer.
   c. Grounding connections to utilize an exothermic welding process, Cadweld connectors, UL Listed, Model GT1161G and straight through couplers.
   d. Grounding wire shall be #6 AWG, solid, bare copper wire.
   e. Ground enhancement material shall be Powerset as manufactured by Loresco, 50 pound bags.
2. Grounding installation:
   a. Each grounding rod shall be driven into the ground its full length 12 feet from the controller and connected via a Cadweld connection to #6 solid, bare copper wire. Additional rods shall be spaced at 20 ft. intervals. The copper wire is to be installed in as straight a line as possible, and if it is necessary to make a turn or bend, it shall be done in a sweeping curve with a minimum radius of 9 inches and a minimum included angle of 90 degrees. There shall be no slices in the bare copper wire. The top of the ground rod shall be driven below the ground surface. A ten inch round valve box shall be placed over the ground rod. A 4 inch grated cover as specified, set a minimum of 1 inch below grade, shall be placed over the grounding plate and a Cadweld connected for periodic maintenance. Cover shall be installed on a minimum of 6 inches of 4 inch ADS corrugated polyethylene, perforated drainage pipe. Plates shall be installed 36 inches below grade with 50 lbs. of Powerset ground enhancement material spread evenly above the plate in accordance with manufacturer's requirements. Plates shall also be covered with a 4 inch grated cover as specified, set a minimum of 1 inch below grade, to facilitate drainage onto the plate. Cover shall be installed on a minimum of 36 inches of 4 inch ADS corrugated polyethylene, perforated drainage pipe.
   b. Multiple controller locations shall have separate grounding for each controller. Grounding rods shall be separated a minimum of 20 feet between grids, plates 3 feet. Grids shall be installed in an irrigated area.

N. High voltage wiring for field satellite:

1. 120V power connection to controllers shall be provided under Division 26 of Specifications. Refer to Division 26 for additional information.
2. All electrical work shall conform to local codes, ordinances, and authorities having jurisdiction.

O. Thrust Blocks:

1. Provide concrete thrust blocks where bell-end ductile iron fittings are installed. Thrust blocks shall be required at all changes in size and direction of bends, reducers, plugs, and the opposite side of "T" intersections. Refer to detail drawings.
2. Thrust block sizes shall be dictated by working pressure, size of pipe, type of fitting and soil conditions. Calculate area required for concrete thrust block in contact with soil. Refer to ductile iron fitting manufacturer's thrust block sizing table to determine sizes for each condition.
3. Allow concrete to cure and complete pressure tests prior to backfilling.

P. Emitter Installation and Operation:

1. Cut emitter tubing using Netafim tubing cutter.
2. Install emitters and/or self-piercing barb connectors in emitter tubing using Rain Bird Bug Gun emitter installation tool.
3. Flush all emitter tubing and PVC lateral lines prior to installation of emitters. Refresh lines after installation of emitters.

3.5 FINAL ADJUSTMENTS

A. Adjust sprinkler heights and vertical alignment, as required, to maintain proper relationship to established grades and planting. Regrade and replant around sprinkler heads as necessary.

B. Fill-in all depressions that arise from possible settlement over trenching or other excavations, with proper soil mix. Compact lightly, and replant as needed to maintain planting design.

C. Adjust nozzles to provide optimum coverage with no overspray to hardscape or building walls.

D. Replace nozzles where required to provide complete coverage.

E. Adjust or relocate moisture sensing equipment, as required, for proper operation.

F. Adjust irrigation schedule and run times to provide adequate water to maintain landscaping.

END OF SECTION 32 84 00

PART 4 - GENERAL

END OF SECTION

SECTION 32 93 00

PLANTING

PART 1 - GENERAL

SECTION 32 93 00 – PLANTING

PART 2 - GENERAL

1.1 SCOPE OF WORK

A. Contractor to furnish all labor, material, equipment, and services required to install all landscape planting, as indicated on the approved drawings and as specified herein, and shall perform all other incidental work necessary to carry out the intent of this specification and drawings including the following:

1. Fine grading, soil preparation, planting of trees, shrubs, vines, ground covers and lawn, guying and staking trees, weed abatement. 90-day Establishment/Maintenance Period.
2. Provide guarantee.

B. All irrigation work shall be approved by the Owner or Landscape Architect prior to any work in this section being performed.

1.2 QUALITY ASSURANCE

A. Nursery Qualifications:

1. Regularly engaged, for the preceding ten years, in the production of planting materials equivalent in species and size to those required.

2. Stocked, and having a demonstrated ability to provide plant materials required within the constraints of the accepted construction schedule.

B. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1. Pesticide Applicator: State licensed, commercial.

C. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1 of the American Standard for Nursery Stock.

D. Pre-installation Conference: Conduct conference at project site with the Landscape Architect, Landscape Contractor, Owner and/or Owner’s Representative.

1.3 BIDDING

A. The amendments, quantities and procedures included herein are for bidding purposes only. Following soil testing by Contractor after rough grading, the amendments, quantities and procedures may change.

B. A minimum of six (6) Agricultural Suitability Soil Tests shall be paid for by the Contractor.

1.4 ANALYSES OF SAMPLES AND TESTS

A. Project Agronomist: Waypoint Analytical : 310-615-0116 or approved equal.

B. Pathology Testing Laboratory (Palms Excluded): Soils and Plant Laboratory: (714) 282-8777; or approved equal.

C. Pathology Testing Laboratory (Palms only for Fusarium): California Seed & Plant Lab: (916) 655-1581.

1.5 AGRONOMIC SOILS REPORT (UNDISTURBED ON GRADE CONDITIONS)

A. The Contractor shall schedule a visit with the Project Agronomist for the purpose of conducting soils analysis from the end of finish grading operations. Soil samples shall be taken by the Project Agronomist from typical tree/shrub locations for analysis by designated soil testing laboratory. Submit soils analysis and recommendations to the Architect for acceptance and re-issue of soil preparation recommendations. Soil analysis shall indicate quantities, chemical properties and recommended manufacturer or supplier. Provide a small scale site plan of testing locations. Soils analysis shall be paid for by the contractor.

1. Methodology: Soil Analysis methodology must include pH measurement in the saturation extract, electrical conductivity of the saturation extract and sodium absorption ratio of the saturation extract. The approved procedures include:
   a. pH Method 21
   b. Saturation extract Method 21
   c. Sodium adsorption ratio Method 20b

2. Approved Methods:
   a. The “American Society of Agronomy” as published in the Methods of Soils`Analysis, “Methods of the United States Salinity Laboratory as published in the Agricultural Handbook Number 60 entitled “Diagnosis and Improvement of Saline and Alkaline soils.”
   b. Base Saturation Methods 18 and 20 of Agricultural Handbook Number 60.
   c. Cation Exchange Capacity – Methods 18 and 20 of Agricultural Handbook Number 60.
   d. Mehlich III texting method is not suitable for alkaline soils and therefore is not an acceptable testing method for Southern California.
   e. The approved methods are those cited by the Council on Soil Testing and Plant Analysis and those methods currently published by Soil Science Society of America Manuals, Communications in Soil Science and Plant Analysis, Soils Science and Soil Science Society of America Journal.

f. Approved methods for phosphorus are Bray P1, Bray P2, Olsen P, DTPA, ammonium acetate and ammonium bicarbonate-DTPA.
g. Approved methods for boron are hot water extract and ammonium bicarbonate-DTPA extract.

B. The following nutrients and elements must be determined with an American Society of Agronomy or Soil Science Society of America approved extraction method. Interpretation data must be given citing concentrations which are considered to be low, medium and high for boron, magnesium, manganese, molybdenum, phosphorus, potassium sodium and sulfur.

C. The saturation extract must be analyzed for calcium, magnesium, sodium, boron, chloride, phosphorus, nitrate and sulfate.

D. The presence of calcium carbonate and/or magnesium carbonate must be determined.

E. The presence of exchangeable ammonium, exchangeable hydrogen, base saturation, exchangeable potassium, calcium, magnesium, and sodium must be determined.

F. Soil Texture: (gravel, sand, silt and clay) and percent gravel must be determined.

G. Determine organic matter content by the measurement of organic carbon. The quality of the organic matter shall be determined by measuring organic carbon and total nitrogen.

H. Interpretation of nutrient deficiencies or excesses and potential toxicities must be determined.

I. Water Infiltration Rate: Method 34b of Agricultural Handbook Number 60.

J. Test results and recommendations shall be approved by the Owner prior to soil preparation to concur with recommendations shown herein.

K. Soil tests shall be performed after soil preparation to confirm that soil preparation was performed in compliance with pre-plant soils report and specifications.

1.6 SUBSTITUTIONS

A. Specific reference to manufacturers' names and products specified in this section are used as standards; this implies no right to substitute other materials or methods without written approval from the Owner.

B. Installation and warranty of any approved substitution shall be Contractor's responsibility. Any changes required for installation or any approved substitution must be made to the satisfaction of the Owner without additional cost to the Owner. Approval by the Owner of substituted equipment and/or dimension drawings does not waive these requirements.

1.7 SUBMITTALS

A. Prior to installation, the Contractor shall submit to the Owner and Landscape Architect two (2) copies of manufacturers' literature, receipts of sale, and laboratory analytical data for the following items:

1. Organic Amendments
2. Soil Conditioner
3. Topsoil (Backfill along Perimeter of Building and Podium Planters)
4. Commercial Fertilizer
5. Mulch
6. Erosion Control Fabric
7. Plant Material

B. Refer to irrigation specifications for additional submittal requirements.

1.8 DELIVERY, STORAGE AND HANDLING

A. Contractor shall furnish standard products in manufacturer's standard containers bearing original labels showing quantity, analysis, and name of manufacturer. All containers, bags, etc., shall remain on site until work is completed.

B. Contractor shall notify Landscape Architect seven (7) days prior to delivery of plant material and submit itemization of plants in each delivery.

C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

D. Handle planting stock by root ball.

E. Where applicable, store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.

F. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

G. Landscape Architect and Owner to review plants upon delivery. Plants that are not healthy or that otherwise do not meet standards will be rejected.

1.9 CLEAN-UP

A. Upon completion of each phase of work under this section, the Contractor shall clean up and remove from the area all unused materials and debris resulting from the performance of the work. The site shall be left in broom-clean condition; wash down all paved areas within the project site and leave walks in a clean and safe condition.

1.10 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
b. Structural failures including plantings falling or blowing over.

2. Warranty Periods from Date of Substantial Completion:

a. Trees, Shrubs, Vines, and Ornamental Grasses 15 gallon and larger: twelve (12) months.
b. Ground Covers, Biennials, Perennials, and Other Plants smaller than 15 gallon: Six (6) months, minimum.
c. Annuals: Two (2) months.

1.11 MAINTENANCE SERVICE

A. Initial Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1) Maintenance Period for Trees and Shrubs: Three (3) months from date of Substantial Completion.
2. Maintenance Period for Ground Cover and Other Plants: Three (3) months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. All plants shall be of the size, variety, age and condition as shown on the drawings and as specified here.

B. Quality - Plants shall be in accordance with the California State Department of Agriculture's regulation for nursery inspections, rules, and grading. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous, and free of insect infestations, plant diseases, sun scales, fresh abrasions of the bark, or other objectionable disfigurements. Tree trunks shall be sturdy and well 'hardened' off. All plants shall have normally well-developed branch structure, and vigorous and fibrous root systems which are not root or pot bound. In the event of disagreement as to condition of root system, the root condition of the plants furnished by the Contractor in containers will be determined by removal or earth from the roots of not less than two (2) plants of each species or variety. Where container grown plants are from several sources, the roots of not less than two (2) plants of each species or variety from each source will be inspected. In case the sample plants inspected are found to be defective, the Landscape Architect reserves the right to reject the entire lot or lots of plants represented by the defective samples.

C. Plants shall be measured when branches are in their normal upright position. Height and spread dimensions specified refer to main body of plant and not branch tip to tip. Caliper measurement shall be taken at a point on the trunk three (3) feet above natural ground line. If a range of size is given, no plant shall be less than the minimum size and not less

than 40 % of the plants shall be as large as the maximum size specified. The measurements specified are the minimum size acceptable and are the measurements after pruning, where pruning is required. Plants that meet the measurements specified, but do not possess a normal balance between height and spread, shall be rejected.

D. Plants shall be nursery grown in accordance with good horticultural practices under climatic conditions similar to those of project for at least two (2) years unless otherwise specifically authorized by the Landscape Architect. All plants shall be heavy, symmetrical, tightly knit, so trained or favored in development and appearance as to be in form, number of branches, compactness and symmetry.

E. All plants shall meet the specifications of federal, state, and county laws requiring inspection for plant diseases and insect control. All inspection certificates required by law shall accompany each shipment, invoice, or order for stock; and when such plants arrive at the site, the certificates shall be delivered to the Landscape Architect.

F. Plants shall be true to species and variety in accordance with the American Association of Nurserymen Standards. Each group of plant materials delivered to the site shall be clearly labeled as to species and variety and nursery source.

G. Plants shall not be pruned before delivery. Trees which have damaged or crooked leaders, or multiple leaders, unless specified, will be rejected. Trees with abrasions of the bark, sun scalds, disfiguring knots, or fresh cuts of limbs over ¾-inch which have not completely callused will be rejected.

H. Plants not conforming to the requirements herein specified will be considered defective and such plants, whether in place or not, will be marked as rejected. Contractor shall immediately remove rejected plans from the premises and replace with new acceptable plants at his expense.

I. There shall be no substitutions of plants or sizes for those listed on the accompanying plans except with the approval of the Landscape Architect.

J. Container stock shall have grown in the containers in which delivered for at least six (6) months, but not over two (2) years. Samples shall show no root-bound conditions. Container plants that have cracked or broken balls of earth when taken from container will be rejected by the Landscape Architect.

K. All boxed trees will require a thorough inspection of the root structure by the Owner/Landscape Architect prior to installation. Only high-quality nursery stock shall be accepted for the project in compliance with the project specifications and the Urban Tree Foundation Guideline Specifications for Nursery Tree Quality (www.urbantree.com).

2.2 TOPSOIL (BACKFILL FOR ON GRADE CONDITION)

A. Topsoil shall be free of roots, clods and stones larger than 1” in the greatest dimension.

B. Imported topsoil shall be from approved locations. Homogenize and remove or break any large clods to less than one (1) inch. Soil samples shall be provided to the Landscape Architect for distribution to Waypoint Analytical for every seven truckloads of topsoil delivered to the site. Samples uld be approved by Wallace Labs prior to trucking and

delivery to the site. Rip sub-grade to depth of 12-inch both ways prior to placing import topsoil. Imported soil placement in six (6) inch lifts and compaction shall not exceed 75%. Perform general soil prep under section 2.4.

Due to on site space restriction around the building, preparation of backfill may need to take place off site prior to trucking the soil back. Contractor is to determine the most efficient and cost-effective option.

C. If top soil imported from outside source, contractor shall notify Owner's representative. Contractor to coordinate with Wallace Labs on soil sample collecting and testing. Contractor to provide location of imported topsoil source for Soils engineer inspection of physical and drainage properties of topsoil.

D. Suitable Soil Criteria:

1. General: Topsoil shall be free of roots, clods and stones larger than 1" in the greatest dimension.
2. Topsoil shall be friable and have sufficient structure in order to give good tilth and aeration to the soil.
3. Gradation limits: ideally, amended soils should be sandy loam or loam. The definition of soil texture shall be the USDA classification scheme. Gravel over two (2) millimeters in diameter shall be less than 20% by weight.
4. Permeability Rate: ideally the hydraulic conductivity rate shall be not less than one (1) inch per hour nor more than 20-inches per hour when tested in accordance with the USDA Handbook Number 60, method 34b or other approved methods.
5. Fertility: the range of the essential elemental concentration in soil shall be as follows:

	Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram dry weight basis
phosphorus	10 - 40
potassium	100 - 220
iron	5 - 35
manganese	0.6 - 6
zinc	1 - 8
copper	0.3 - 5
boron	0.2 - 1
magnesium	50 - 150
sodium	0 - 100
sulfur	25 - 500
molybdenum	0.1 - 2

6. Acidity: the soil pH range measured in the saturation extract (Method 21a, USDA Handbook Number 60) shall be 6.0 - 7.9.
7. Salinity: the salinity range measured in the saturation extract (Method 3a, USDA Handbook Number60) shall be 0.5 - 2.5 dS/m.

8. Chloride: the maximum concentration of soluble chloride in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 150 mg/l (parts per million).
9. Boron: the maximum concentration of soluble boron in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 1 mg/l (parts per million).
10. Sodium Adsorption Ratio (SAR): The maximum SAR shall be three (3) measured per Method 20b, USDA Handbook Number 60.
11. Aluminum: Available aluminum measured with the Ammonium Bicarbonate/DTPA Extraction shall be less than three (3) parts per million.
12. Soil Organic Matter Content: Sufficient soil organic matter shall be present to impart good physical soil properties but not be excessive to cause toxicity or cause excessive reduction in the volume of soil due to decomposition of organic matter. The desirable range is three (3) % to six (6) %. The carbon nitrogen ratio should be about 10. A high carbon: nitrogen ratio can indicate the presence of hydrocarbons or non-humified organic matter.
13. Calcium Carbonate Content: Free calcium carbonate (limestone) shall not be present for acid-loving plants.
14. Heavy Metals: The maximum permissible elemental concentration in the soil shall not exceed the following concentrations:

Ammonium Bicarbonate/DTPA Extraction; parts per million (mg/kilogram) for dry weight basis:

phosphorus	10 - 40
potassium	100 - 220
iron	5 - 35
manganese	0.6 - 6
zinc	1 - 8
copper	0.3 - 5
boron	0.2 - 1
magnesium	50 - 150
sodium	0 - 100
sulfur	25 - 500
molybdenum	0.1 - 2

15. Heavy Metals and Soil pH: If the soil pH is between six (6) and seven (7), the maximum permissible elemental concentration shall be reduced 50%. If the soil pH is less than 6.0, the maximum permissible elemental concentration shall be reduced 75%. No more than three metals shall be present at 50% or more of the above values.
16. Phytotoxic constituent, herbicides, hydrocarbons: Germination and growth of monocots and dicots shall not be restricted more than ten (10) % compared to the reference soil. Total petroleum hydrocarbons shall not exceed 50 mg/kg dry soil measured per the modified EPA Method No. 8015. Total aromatic volatile organic hydrocarbons (benzene, toluene, xylene and ethylbenzene) shall not exceed 0.5 mg/kg dry soil measured per EPA Methods No. 8020.

E. The Contractor shall coordinate with the Landscape Architect and Wallace Labs for soil sample collecting and testing, submit soils analysis, recommendations and topsoil sample to the Landscape Architect for approval. Import topsoil shall not be delivered to the site

prior to Landscape Architect, Owner, Soil Engineer and Wallace Labs approval. The Landscape Architect may request additional testing of imported topsoil at the site to determine conformance to the approved report. Rejected topsoil shall be removed at no cost to the Owner.

F. If stockpiling is requested, locations and amounts of stockpile shall be approved by the Owner.

2.3 SOIL AMENDMENTS AND FERTILIZER FOR ON- SITE TOPSOIL

A. Recommendations:

1. Protect the planter soils from contamination of stucco, paints, welding flux, and other building materials.
2. Remove debris, trash, clods, etc. larger than one (1) inch in diameter.
3. Landscape contractor shall submit soil for test and coordinate with EPTDESIGN and Wallace Labs for soil testing prior to soil preparation.

B. General soil preparation for turf, ground cover and shrub areas:

1. Remove debris, clods, rock, gravel and foreign material larger than one (1) inch in diameter from the top 12- inches. The following amendment rates are per 1,000 square feet and are to be used for estimation during the bid process: Incorporate following homogeneously six (6) inches deep: 3 cubic yards Organic Compost; 5 pounds Ammonium sulfated (21-0-0); 6 pounds Potassium sulfate (0-0-50); 3 pounds Triple superphosphate (0-45-0); 10 pounds Agricultural gypsum; 20 pounds P.A.M. Soil Drain Amendment per manufacturer directions.
2. Cure the soil to activate the soil conditioner. Irrigate the soil to dampen the soil to a depth of six (6) inches. The soil does not need to be saturated, just damp. Allow the soil to dry or, -at least dry to the point where the stringiness has disappeared. Then re-rototill the soil to a six (6) in depth until soil is friable.

C. Preparation of backfill for container plants, boxed trees and augers (including Tree drainage and outside inspection tubes – use backfill in place of crushed rock), homogeneously blend the following materials into excavated soil. Rates are expressed per cubic yard and are to be used estimation during the bid process. Remove debris, clods, rock, gravel and foreign material larger than one (1) inch in diameter.

1. 15% - Organic Compost Amendment.
2. 85% - Native Topsoil (Must be dry and friable prior to mixing with amendments,)
3. 1 pound - Agricultural gypsum.
4. 1/4 pound- Potassium sulfate (0-0-50).
5. 1/4 pound - Ammonium sulfate (21-0-0).
6. 1/4 pound - Triple superphosphate (0-45-0).
7. 2 ounces - P.A.M. Soil Drain Amendment per manufacturer directions.

D. Organic soil amendments:

1. Soil Organic Amendment: The product shall be based upon manure, compost or sludge. Wood residues, sawdust or shavings are not acceptable. The ash content shall be at least 15% and not more than 25%. Sand content shall be less than 2%. The pH shall not be less than 5.0 or more than 7.5. The ECe shall be less than 5.0.
2. Organic Compost: Washed Steer Humus from Earthworks. Telephone: (909) 270-0088; or approved equal. “Forest Floor Humus” from Aguinagua Fertilizer Company. Telephone: (949) 751-9706; or approved equal.

2.4 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

Inorganic Soil Amendments:

1. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   a. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve a minimum of 75 percent passing through No. 60 sieve.
   b. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
2. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
3. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
4. Aluminum Sulfate: Commercial grade, unadulterated.
5. Perlite: Horticultural perlite, soil amendment grade.
6. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.
7. Sand: Clean, washed, natural or manufactured, and free of toxic materials.
8. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
9. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.5 AMENDED SOIL MIX FOR PLANTER POTS

A. Soil to be used as planting medium for all planter pots.

B. Product: LWPS 33 (Light Weight Potting Soil) from Earthworks. Earthworks. Telephone: (951) 538-3321; or approved equal.

C. Provide Mix in sufficient quantities which allow for natural settling and compaction of the mix prior to installing Plant Materials. Mix shall be compacted to 90% density to minimize

settling. Set mix and compact accordingly in six (6) inch lifts, to within two(2) inch of top of the Planting Pot..

2.6 PESTICIDES AND HERBICIDES

A. All chemicals used for weed control shall be registered by the State of California Department of Food and Agriculture and the Environmental Protection Agency with registration identification on the label. Label shall be at job site at all times.

B. All chemicals shall be applied as per registered label instruction and manufacturer's recommendations.

C. Chemicals requiring a licensed applicator must be applied by persons registered with the local county's Department of Agriculture's Commissioner's Office as possessing a current, valid, qualified pest control applicator's license.

D. The use of any restricted materials is forbidden unless a special use permit is obtained from the local county's Department of Agriculture.

E. The herbicide shall be Fucilade for weed grasses and SpeedZone Southern for broadleaf weeds.

F. Do not apply pre-emergent herbicides until plants are established

2.7 SEED

A. Seed shall be of the species and variety specified on the plans. Wet, moldy, or otherwise damaged seed shall not be acceptable.

B. The Contractor shall have all seed to be used on the project officially tested by the California State Department of Agriculture and shall submit to the Landscape Architect prior to hydro- seeding, official seed labels, and a signed statement from the Agriculture Department certifying that the seed meets the analysis shown on the labels. Unlabeled collected seed shall be tested and analyzed and the results furnished in lieu of the seed labels.

C. The seed quantities listed shall be on the basis of pure live seed.

$$\text{Total Seed Material} = \frac{\text{Pounds pure, live seed required}}{\text{Percent purity x percent germination}}$$

2.8 TURF

A. Turf species shall be Bullseye Bermuda, as shown in the Drawings.

B. Soil base shall be sandy loam or loam.

C. Soil base shall be clean topsoil.

D. The following weed seeds are not permissible

1. Quackgrass
2. Johnson grass
3. Nutsedge
4. Poison ivy
5. Canada thistle
6. Poa annua (Annual Bluegrass)

E. Premium grade – not more than one (1) % undesirable grass species or clover. No more than ten (10) weeds per 500 square feet.

F. Commercial grade – not more than ten (10) % undesirable grass species or clover. No more than ten (10) weeds per 500 square feet.

G. Thickness of soil portion of sod should not exceed ½-inch.

2.9 STONE MULCH

A. Crushed Gravel: stone with angular surfaces; gravel size and color as indicated on plans.

2.10 STAKING MATERIALS

2

A. Wood Stakes: Tree stakes shall be straight grained lodge pole pine free of knots, splits, checks, or disfigurements. Stakes shall be three (3) inch minimum nominal size in diameter and 8-feet in length. All lodge pole pine stakes shall have a ten (10) inch tapered driving point and chamfered top and shall be untreated natural wood color, as manufactured by C & E Lumber Company of Pomona, CA. Telephone: (714) 626-3591; or approved equal

B. Supports for wood stakes shall be 32-inch black cinch type; two (2) double cinch ties per tree; V.I.T. Company, Inc. 15561 Product Land, D-4, Huntington Beach, CA. Telephone: (714) 891-8338.

2.11 GUYING MATERIALS

A. Guy wire shall be double stranded 12 gauge galvanized wire.

B. Turnbuckles shall be galvanized or dip-painted and weldless.

C. Cable clamps shall be galvanized or copper, size as required.

D. Guy wire cover shall be PVC ½-inch diameter and shall be six (6) feet in length or provide 90 % cover of guy wire. Apply (2) coats of black paint.

E. Guying collar shall be per V.I.T. The collar shall completely cover the wire and loop around tree limbs. It shall be long enough to permit tree movement within the loop.

F. Anchor to be two (2) inch x two (2) foot length, 15 gauge, galvanized steel pipe. Drill holes as specified to receive wire.

2.12 ROOT CONTROL BARRIERS

A. Root control barriers shall be provided as indicated on the plans, as required in the local governing agency tree planting guideline, and as specified herein.

B. Root control barriers shall be constructed of injection molded copolymer polypropylene with 50% postconsumer recycled plastic and UV inhibitors as manufactured by Deep Root Corp., Westminster, CA, or approved equal.

C. Root control barriers shall be a minimum of 18-inch depth and .08-inch thick when installed adjacent to sidewalk, 36-inch depth and .08-inch thick when installed adjacent to curb.

D. Root control barriers shall be linear.

PART 3 - EXECUTION

1.01 3.1 GENERAL

A. Perform actual planting only during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice.

B. Confirm location and depth of underground utilities and obstructions. If underground structures or utility lines are encountered in the excavation of planting areas, other locations for planting shall be approved by the Landscape Architect.

C. All planting layout and staking shall be accurately made in accordance with the plans. All trees shall be a minimum of three (3) feet from local government agency maintenance limit line.

D. Plant locations shall be approved by the Landscape Architect prior to excavation and may be subject to spacing and distances required by local governing agency standards.

3.2 FINISH GRADING

A. All grading and mounding with the exception of final planting shall be completed prior to soil preparation.

B. Planting areas shall be free of all weeds (plants not specified in planting areas), stones, stumps, roots, or other debris one (1) inch in diameter and greater.

C. Soil shall be graded to a smooth and even surface conforming to required finish grade. Finish grade adjacent to walks, paved areas, curbs, manholes, clean-outs, valve boxes, and similar features shall be one (1) inch below the surface in turf and two (2) inches below in ground cover/shrub areas. Grades between such features shall be carefully sustained and blended to eliminate abrupt changes.

D. Planting areas to receive sod shall sustain a finish grade of such depth that the top of installed sod shall be flush with finish surfaces (walks, paved areas, etc.).

E. Contractor shall allow for soil amendments when establishing sub-grade elevations. All planting areas shall have a finish grade conforming to approved plans and specifications after full settlement has occurred.

F. All planting areas adjacent to buildings shall be graded to drain away from the building at a minimum of two (2) % slope, for a minimum of five (5) feet horizontal distance.

3.3 SOIL PREPARATION

A. Cross-rip soil to a minimum depth of 12-inches. Thoroughly rototill a minimum of two (2) directions the following amendments into the top 12-inches of soil and irrigate thoroughly. (Per 1,000 square feet.) Refer to item 2.4 soil amendment.

B. Planting areas with slopes 2:1 and steeper shall not be soil prepared unless directed by Landscape Architect.

C. Contractor shall not work under muddy conditions.

D. Should 30-calendar days elapse between completion of soil preparation and commencement of planting, all areas shall be prepared again.

3.4 PLANTING OF TREES, SHRUBS, AND VINES

A. Excavation: Planting holes shall have irregular, non-glazed sides, and shall be a minimum of twice the diameter, and 1-½ times the depth of the original plant container.

B. Planting procedure for container grown material:

1. Backfill plant pit with well-tilled on-site soil without amending to the depth of the rootball. Water thoroughly and compact backfill in such a manner so that after settling, the crown of the plant stem is two (2) inches above adjacent grade. Center plant in pit.
2. Uniformly blend amended backfill at a centralized location in minimum one (1) cubic yard lots. Backfill amendments shall be as indicated on the approved agronomic soils report. Mixing in plant pits or beds will not be permitted. Make available for inspection, all delivery slips and analytical data from approved laboratories for specified organic amendments. For bidding purposes use the following mixture:
3. Refer to item 2.4 for backfill amendment. In upper 12-inches of backfill, add a soil blend Nitrogen stabilized organic amendment as recommended on item 2.4. Soil below this depth shall not contain organic amendment.
4. Place slow release fertilizer tablets in upper 18-inches of backfill. Plant tablets shall be required for all tree, shrub and vine plantings. Application rate and nutrients shall be per the manufacture’s recommendation.
5. Backfill remainder of plant pit around the rootball with amended backfill. Firm down, eliminating air pickets. Do not pack. Form a shallow basin around the plant to hold enough water to saturate the rootball and backfill.
6. Immediately after planting, apply water to each tree and shrub by means of a hose. Apply water in a moderate stream in the planting hole until the material about the roots is completely saturated from the bottom of the hole to the top of the ground. Add additional amended backfill material as necessary to correct any settlement around rootball.

D. Sub Drainage: Four (4) inch diameter PVC (SDR-35) perforated for horizontal pipe at bottom of plant pit on each side of rootball, wrapped with filter fabric sock. Vertical clean out should be solid four (4) inch diameter PVC (SDR-35) with NDS black drain grate inserted at finish grade. Connect to civil storm drain where ever possible. If not possible connect to drain sump (six (6) inch diameter auger a minimum of six (6) feet below bottom of plant pit with four (4) inch diameter perforated PVC (SDR-35) and filter fabric sock, backfilled around outside of pipe with the specified clean, washed sand backfill.

3.5 GROUND COVERS

A. Ground cover plants shall not be allowed to dry out before or while being planted. Roots shall not be exposed to the air except while actually being placed in the ground. Wilted plants will not be accepted.

B. Plant ground covers in straight rows evenly spaced, and at intervals required by drawings, use triangular spacing.

C. Plant each rooted plant with its proportionate amount of flat soil. Immediately water after planting until entire area is soaked to full depth of each hole.

D. Protect plants from damage and trampling at all times.

E. In all shrub and groundcover areas, apply minimum three (3) inch layer of Commercial grade shredded hardwood bark mulch, uniform in size, and free of sticks, stones, clods or other foreign material. 0-2" "Forest Floor" from Aguinagua Fertilizer Company. Telephone: (949) 751-9706; or approved equal. Contractor shall submit sample to Landscape Architect for approval.

3.6 TURF

A. General:

1. After soil preparation, establishment of final grades, and weed abatement, carefully smooth all surfaces to be planted, roll area to expose soil depressions or surface irregularities. Re-grade as required. Prior to planting, the soil shall be loose and friable to receive turf.
2. Immediately prior to planting, evenly broadcast a pre-plant commercial fertilizer as recommended in the approved agronomic soils report. Rake in lightly. Avoid planting of turf on dry soil.
3. Turf shall be planted by seeding, hydro-seeding, stolonizing, or sodding as indicated on the plans.

3.7 INSPECTION

A. All inspections herein specified shall be made by the Landscape Architect. The Contractor shall request inspection at least two (2) working days in advance of the time inspection is required.

B. Inspection will be required for the following parts of the work:

1. During the preliminary fine finish grading and soil preparation.
2. When fine finish grading and soil preparation are completed.

3. Plants after delivery to site (prior to planting), when shrubs and trees are spotted for planting,
   but before planting holes are excavated.
4. Specimen trees at source before delivery.
5. Planting areas prior to planting.
6. All landscape construction items, prior to the start of the Maintenance period.
7. Final inspection at the end of the Maintenance period provided that all previous deficiencies have been corrected.

3.8 WATERING

A. Watering of turf to commence immediately after completion of job and to continue at a rate necessary to keep area moist without drying out or puddling. Normally irrigating ONCE AN HOUR for a short duration and continuing this procedure each and every day light hour, seven (7) days a week will be sufficient. This continual moist condition is to prevail each and every day until seeds are well rooted. After the rooting stage is completed, irrigation should still continue on the basis of at least once or twice a day until turf is well established.

B. Immediately after planting, apply water to each tree, shrub and ground cover by means of a hose. Apply water in a moderate stream in the planting hole until the material about the roots is completely saturated from the bottom of the hole to the top of the ground.

C. Water plants which cannot be watered efficiently with the existing water system by means of a hose.

D. Apply water in sufficient quantities, and as often as seasonal conditions require, and keep the ground wet at all times, well below the root system of grass and planting. Do not cause erosion damage in watering slopes.

3.9 LANDSCAPE MAINTENANCE WALK PROTOCOL

A. Interim Maintenance Start (Prior to 90-Day Irrigation Coverage Test): It shall be the responsibility of the General Contractor to establish a meeting to conduct the irrigation coverage test. Attendees shall include the Landscape Architect and Landscape Contractor. The walk shall cover irrigation coverage, functionality and color coated controller charts provided by the Landscape Contractor. A punch list will be generated in preparation for the next site walk. All equipment shall be verified during this meeting.

Pre-Maintenance Walk / Irrigation Coverage Test: It shall be the responsibility of the General Contractor to establish meeting to confirm punch list items are complete. Attendees shall include Landscape Architect, Irrigation Design Consultant, Installing Landscape Contractor, and General Contractor.

The date of the beginning of the ninety (90) day Maintenance period will be established based on the successful completion of the Pre-Maintenance walk. The walk shall cover irrigation coverage, functionality and controller charts provided by the landscape contractor, review of installed plant material, staking, mulch, decomposed granite, gravel, headers, boulders, and all other items within the Landscape Contractor's scope of work.

Remote will be required *(Landscape Contractor's Responsibility)* for all irrigation walks in order to expedite the process. Valves shall be activated from the controller by remote or

use of two-way radios. Manual valve activation is not acceptable prior to 90-day maintenance walk.

If the Pre-Maintenance walk for the irrigation is successful it will be determined at that time when the 90-day Maintenance period will be established.

If the Pre-Maintenance walk for the irrigation is not successful it will be the responsibility of the Landscape Contractor to address the irrigation punch list items prepared by the Landscape Architect. An additional punch walk with the General Contractor, Landscape Architect and Landscape Contractor will be required to check the irrigation corrections prior to establishing a date for the ninety (90) day Maintenance period.

The irrigation punch list shall be provided by the Landscape Architect to the General Contractor, Director Construction and Landscape Contractor within 72 hours. The commencement date of the ninety (90) day Maintenance period shall be provided by the Landscape Architect in a 90–Day Maintenance Letter.

B. 90-Day Final Acceptance: It shall be the responsibility of the General Contractor to establish the 90 Day Maintenance Walk for irrigation. Attendees shall include, General Contractor, Landscape Maintenance Contractor, Landscape Contractor, Landscape Architect and Owner/Representative.

This walk will review the items from the Pre-Maintenance Walk punch list and ensure these items have been completed. Maintenance will start once all items noted on the Pre-Maintenance Walk have been addressed.

C. Final Project Turnover: It shall be the responsibility of the General Contractor to establish the Final Project Turnover date with the, Owner, Landscape Maintenance Contractor, and Landscape Contractor for completion of all phases of construction.

The General Contractor shall document the final acceptance.

One (1) set of the Irrigation “as-built” plans *(30x42 – on bond)* shall be developed by the Landscape Contractor before the final phase acceptance walk. Completed “as-built” shall be submitted to the Landscape Architect for review and approval.

After approval of the Irrigation “as-built” plans the Landscape Contractor shall provide and additional sets as requested by the Owner/Representative.

The installing Landscape Contractor shall include the following items, but not limited to: Controller charts, quick coupler keys, controller operation manuals, special tools required to adjust, install, disassemble, or remove any sprinkler or valves supplied on the project where applicable and other pertinent information at final turnover.

Landscape Contractor shall provide a letter of guarantee for the completed landscape installation to the General Contractor

END OF SECTION 32 93 00

1.02

END OF SECTION

SECTION 33 05 00

INSTALLATION OF BURIED PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes placement of buried pipelines and connections.

1.02 RELATED WORK DESCRIBED ELSEWHERE

A. Section 312333 - Trenching, Backfill and Compaction

1.03 SUBMITTALS

A. Installation schedule.

B. Product data for each type of warning tape. 2

PART 2 - MATERIALS

2.01 PIPE MATERIAL

A. Refer to the section on pipe by type.

2.02 ACCESSORIES

A. Non-Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick.

B. Detectable Warning Tape: Provide an inert polyethylene film detectable warning tape manufactured for marking and identifying underground utilities, 6 inches wide with a minimum metallic foil core of 0.35 mils and shall be reinforced, consisting of 5 mils total thickness.

C. Continuously inscribe warning tape with a description of the utility; colored as follows:
   1. Red: Electric.
   2. Yellow: Gas, and dangerous materials.
   3. Orange: Telephone and other communications.
   4. Blue: Water systems.
   5. Green: Sewer systems.
   6. Purple: Reclaimed Water System

D. Detectable wire
   1. Tracer wire shall be provided when non-detectable warning tape is used for plastic piping. Insulated No. 12 copper tracer wire shall be buried with the pipe and ends brought to surface.

PART 3 - EXECUTION

3.01 DELIVERY AND TEMPORARY STORAGE OF PIPE AT SITE

A. Limit on-site pipe storage to a maximum of one week.

B. Avoid damage to the pipe. If necessary, provide suitable supports.

3.02 HANDLING OF PIPE

A. Lift pipes with handling beams or wide belt slings as recommended by the pipe manufacturer. Do not use cable slings.

3.03 SANITATION OF PIPE INTERIOR

A. During laying operations, do not place tools, clothing or other materials in the pipe.

B. When pipe laying is not in progress, close the ends of the pipe by a vermin-proof plug constructed in a manner to deter entry by children and prevent the entrance of animals and foreign materials.

3.04 PLACEMENT OF PIPE IN TRENCH

A. Control water in trench per Section 312333.

B. Lay pipes uphill if the grade exceeds ten percent (10%).

C. Where pipe bedding material is detailed below the subgrade, place and compact the bedding.

D. Cut a depression to accommodate the pipe bell and external joint filler form and spaces to permit removal of the pipe handling slings.

E. Lower the pipe onto the bedding and install it to line and grade along its full length of firm bearing except at the bell and at the sling depressions. The tolerance on grade is one-quarter inch (1/4"). The tolerance on line is one inch (1").

F. Proceed to complete the pipe embedment as specified in Section 312333.

G. The radius of curvature of the trench shall determine the maximum length of pipe section that can be used without exceeding the allowable deflection at a coupling. The deflection at any flexible joint shall not exceed that prescribed by the manufacturer of the pipe. The manufacturer's printed installation guide outlining the radii of curvature that can be negotiated with pipe sections of various lengths shall be followed.

H. Proper implements, tools and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the Contractor for safe and efficient execution of the work. All pipe, fittings, valves and accessories shall be carefully lowered into the trench by means of handling beams, wide belt slings or

other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

I. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, nor any other method that may fracture the pipe or will produce ragged, uneven edges.

J. The pipe and accessories shall be inspected for defects prior to the lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench.

K. When the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers or main drains, the obstruction shall be permanently supported, relocated, removed or reconstructed by the Contractor in cooperation with owners of such utility structures. Unless otherwise indicated, this work shall be performed at the Contractor's expense.

3.05 ASSEMBLING RUBBER RING JOINTS

A. Clean the ends of the pipe to be joined of foreign material.

B. Immediately prior to lowering each section of pipe into the trench, apply a nontoxic water soluble vegetable soap solution to the inside of the bell of the pipe in the trench and to the rubber gasket and spigot groove of the pipe to be installed. Stretch the rubber gasket into the groove of the spigot end of the pipe to be inserted and distribute it uniformly around the circumference.

C. Without tilting the pipe to be installed, enter its spigot into the bell of the pipe in the trench. Use come-a-longs or pipe jacks to drive spigot end home horizontally. Maintain joint recess recommended by pipe manufacturer or made-up joint. Where deflections at joints are required for curved alignment, do not exceed the pipe manufacturer's recommended maximum joint opening on one side.

3.06 OPERATIONS INCIDENTAL TO JOINT COMPLETION

A. Plan joint completion to accommodate temporary test bulkheads for hydrostatic testing.

3.07 PIPE EMBEDMENT

A. Provide sufficient space along each side of the pipe and the trench wall per plans to observe that the embedment material fills all spaces below pipe spring line under the pipe haunches.

B. Start the backfilling operations specified in Section 312333 immediately after coating the field joints.

3.08 PIPELINE CLOSURE ASSEMBLIES

A. Employ pipeline closure assemblies to unite sections of pipeline laid from opposite directions and to adjust the field length of the pipeline to meet structures, other pipelines, and points established by design stations.

3.09 FLANGED CONNECTIONS

A. Lubricate nuts and bolts with oil or graphite prior to installation.

B. Coat flanges and non-stainless-steel bolts with bitumen as specified.

C. Wrap flanges which connect with buried valves or other equipment with two layers of polyethylene film specified for the valves and equipment. Extend the wrap over the flanges and bolts and secure it around the adjacent pipe circumference with tape.

END OF SECTION

SECTION 33 14 00

HYDROSTATIC TESTING OF PRESSURE PIPELINES

PART 1 - GENERAL

1.01 DESCRIPTION

A. These specifications designate the requirements for field pressure and leakage testing of all new and replaced existing water mains intended for the conveyance of potable, fire water and reclaimed water under pressure. The Contractor shall furnish all labor, materials (including water), tools, and equipment necessary to provide and complete field testing as specified. All pipelines shall be tested for water tightness by subjecting each section to Hydrostatic Pressure and Leakage Tests in accordance with the applicable requirements of AWWA C 600 except as modified herein.

1.02 SUBMITTALS

A. Hydrostatic test results shall be submitted for review and approval.

1.03 JOB CONDITIONS

A. For potable water pipelines, obtain and use only potable water for hydrostatic testing.

B. Submit request for use of water from waterlines to College Project Manager 48 hours in advance.

C. The testing shall be witnessed by the College Project Manager. 2

PART 2 - MATERIALS

2.01 MANUAL AIR-RELEASE VALVES

A. Provide temporary manual air-release valves for pipeline test. Construct the pipe outlet in the same manner as for a permanent air valve and after use, seal with a blind flange, pipe cap, or plug and coat equal to the adjacent pipe.

PART 3 - EXECUTION

3.01 TESTING AND DISINFECTION SEQUENCE

A. Perform required chlorination subsequent to hydrostatic testing, except when pipeline being tested is connected to a potable waterline.

B. The test shall be made prior to connecting the new line with existing pipe and mains. The test shall further be conducted with valves open, and the open ends of pipes, valves, and fittings suitably closed. Valves shall be operated and checked during to the test period. No leakage shall be allowed when testing across any valves.

3.02 INITIAL PIPELINE FILLING

A. Maximum rate of filling shall not cause water velocity in pipeline to exceed 1 fps. Filling may be facilitated by releasing air manually.

3.03 PRESSURE AND DURATION OF TEST

A. All pipe shall be tested at a hydrostatic pressure of 120 percent of maximum rated operating pressure of the pipe, but shall be not less than 200 psi.

B. When the system is pumped to the required test pressure, the pump shall be disconnected and maintain the test pressure for the following duration by restoring it whenever it falls an amount of 10 psi: pipe of 18 inches in diameter and smaller, 4 hours; over 18 inches to 36 inches in diameter, 8 hours; and over 36 inches in diameter, 24 hours.

C. Temporary or permanent thrust blocks shall be cast-in-place as required prior to tests, and the Contractor shall provide all necessary braces, plugs, thrust blocks, caps, flanges, and other materials to permit proper conduct of the pressure testing. Concrete blocks shall be cast not less than 5 days before the test.
   1. All concrete anchor blocks shall be allowed to cure a sufficient time to develop a minimum strength of 2,000 psi before testing, unless otherwise directed by the College Project Manager.

3.04 ALLOWABLE LEAKAGE

A. Permit one to three days for the filled pipeline to soak and to release entrapped air. Apply the test pressure with a positive displacement pump. Provide a snubber or dampener between the pump and the pipeline to reduce instantaneous pressure pulses to 10% of the specified test pressure. Draw from containers in which the volume of water can be readily measured or through a positive displacement meter. The amount of water used to maintain the test pressure during the test period is the leakage. Determine the allowable leakage by the following:

$$L = \frac{N*D(P)1/2}{7,400}$$

where L is the allowable leakage in gallons per hour,
N is the number of pipe joints in the test section,
D is the inside pipe test diameter in inches,
P is the pipe test pressure (psi), which is defined as the average of the highest and lowest test pressures in the pipe section being tested.

*N does not include any flanged or welded joints.

3.05 REPETITION OF TEST

A. If the actual leakage exceeds the allowable, locate and correct the faulty work and repeat the test. Restore the work and all damage resulting from the leak and its repair at no additional cost to the college. All visible leakage shall be eliminated.

END OF SECTION

THE LINE SHOWN ABOVE IS EXACTLY 1" LONG ON ORIGINAL BOND PLANS
0" 1"

LINE TABLE		
LINE #	LENGTH	BEARING
L2	22.87'	N89°22'31"E
L3	28.15'	N00°40'32"W
L4	12.49'	N89°06'25"E
L5	23.58'	N00°37'29"W
L6	51.32'	N79°33'40"E
L7	51.32'	N79°33'40"E
L8	6.26'	N00°37'29"W
L9	56.90'	N00°37'29"W
L10	51.25'	S81°18'13"E
L11	51.25'	S81°17'46"E
L12	18.67'	N00°37'29"W
L13	64.02'	N00°37'29"W
L14	50.57'	N89°22'31"E
L15	50.57'	N89°22'31"E
L16	16.00'	N00°37'29"W

LINE TABLE		
LINE #	LENGTH	BEARING
L17	59.42'	N00°37'29"W
L18	29.70'	N45°40'28"E
L19	77.52'	N90°00'00"W
L20	29.25'	S45°40'28"E
L21	16.39'	S00°27'43"E
L22	224.12'	S89°22'31"W
L23	41.19'	S00°37'29"E
L24	17.00'	S89°22'31"W
L25	12.00'	S00°37'29"E
L26	3.00'	S89°22'31"W
L27	12.00'	N00°37'29"W
L28	17.00'	S89°22'31"W
L29	32.82'	S00°37'29"E
L30	11.75'	N80°37'29"W
L31	17.67'	S09°22'31"W

LINE TABLE		
LINE #	LENGTH	BEARING
L32	14.87'	S80°37'29"E
L33	31.55'	S00°37'29"E
L34	9.00'	N89°22'31"E
L35	5.00'	N00°37'29"W
L36	3.00'	N89°22'31"E
L37	5.00'	S00°37'29"E
L38	13.00'	N89°22'31"E
L39	5.00'	N00°37'29"W
L40	3.00'	N89°22'31"E
L41	5.00'	S00°37'29"E
L42	9.00'	N89°22'31"E
L43	25.03'	N00°37'29"W
L44	4.50'	S80°37'29"E
L45	7.51'	N80°37'29"W
L46	30.41'	N00°37'29"W

LINE TABLE		
LINE #	LENGTH	BEARING
L47	6.00'	N89°22'31"E
L48	44.13'	N00°37'30"W
L49	50.25'	N89°22'31"E
L50	23.82'	S00°37'29"E
L51	14.36'	N00°37'29"W
L52	132.74'	N89°22'31"E
L53	13.52'	S00°37'29"E
L54	22.31'	N00°37'29"W
L55	20.86'	N89°22'31"E
L56	81.63'	S00°37'29"E
L57	7.55'	S08°41'47"W
L58	11.20'	S80°59'01"E
L59	7.61'	N09°00'59"E
L60	72.91'	N81°18'13"W
L61	9.01'	N80°59'51"W

LINE TABLE		
LINE #	LENGTH	BEARING
L62	63.19'	N81°18'13"W
L63	11.00'	N81°18'13"W
L64	48.10'	N81°18'13"W
L65	80.64'	N00°37'29"W
L66	67.59'	S80°37'29"E
L67	8.02'	S09°22'31"W
L68	31.65'	N80°37'20"W
L69	6.37'	S09°22'23"W
L70	2.73'	S80°55'41"E
L71	5.99'	S80°58'21"E
L72	37.27'	S09°22'30"W
L74	5.39'	S80°37'29"E
L76	12.05'	S80°37'30"E
L77	33.86'	S09°22'30"W
L78	59.52'	N09°22'30"E

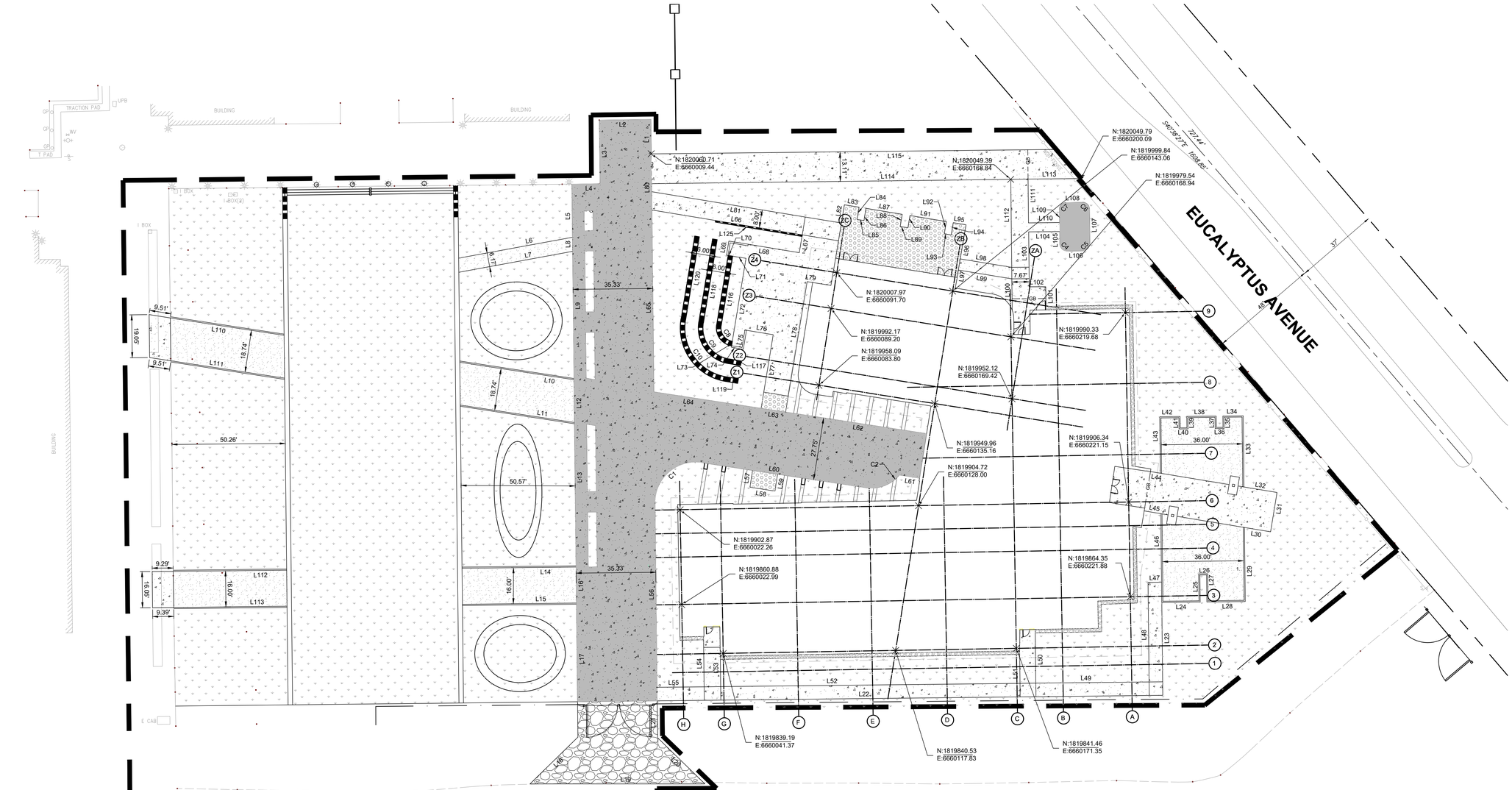
LINE TABLE		
LINE #	LENGTH	BEARING
L79	2.46'	S80°59'01"E
L80	3.57'	S00°37'29"E
L81	85.26'	S80°37'29"E
L82	8.20'	N09°20'17"E
L83	6.58'	S80°37'29"E
L84	5.50'	S09°21'28"W
L85	3.11'	S80°38'30"E
L86	5.50'	N09°21'45"E
L87	16.29'	S80°38'30"E
L88	5.50'	S09°22'05"W
L89	3.46'	S80°38'27"E
L90	5.50'	N09°22'05"E
L91	16.35'	S80°38'17"E
L92	5.51'	S09°22'05"W
L93	3.11'	S80°38'30"E

LINE TABLE		
LINE #	LENGTH	BEARING
L94	5.51'	N09°22'05"E
L95	5.75'	S80°38'23"E
L96	15.33'	S09°37'25"W
L97	3.32'	S09°22'31"W
L98	23.12'	S80°40'43"E
L99	24.04'	N80°40'43"W
L100	13.93'	N00°37'29"W
L101	10.25'	S00°37'29"E
L102	7.32'	N89°42'29"E
L103	24.35'	S00°37'29"E
L104	13.78'	S89°22'31"W
L105	5.55'	N00°37'29"W
L106	7.05'	S89°22'31"W
L107	15.35'	S00°37'29"E
L108	7.30'	N89°22'31"E

LINE TABLE		
LINE #	LENGTH	BEARING
L109	5.82'	N00°37'29"W
L110	13.78'	N89°22'31"E
L110	51.05'	S81°18'13"E
L111	19.41'	S00°37'29"E
L111	51.01'	S81°18'13"E
L112	50.34'	N89°22'31"E
L112	39.00'	N00°37'29"W
L113	23.58'	S89°22'31"W
L113	50.24'	N89°22'31"E
L114	159.27'	S89°19'32"W
L115	179.59'	N89°22'31"E
L116	31.23'	N09°23'21"E
L117	5.34'	S80°37'29"E
L118	37.32'	S09°22'40"W
L119	5.34'	S80°37'29"E

LINE TABLE		
LINE #	LENGTH	BEARING
L120	37.27'	S09°22'42"W
L125	38.92'	N80°37'29"W

CURVE TABLE				
CURVE#	LENGTH (FT.)	RADIUS (FT.)	DELTA	TANGENT (FT.)
C1	31.20	18.00	99°19'20"	21.20
C2	17.29	16.22	61°05'20"	9.57
C8	9.42	6.00	90°00'00"	6.00
C9	21.99	14.00	90°00'00"	14.00
C10	34.56	22.00	90°00'00"	22.00



LEGEND

- CONCRETE PAVING PER DETAIL 1 / SHEET C9.00
- UNIT PAVERS PER LANDSCAPE PLANS, DETAIL 6 / SHEET L1.51
- COMPACTED FIRE ACCESS ROAD PER DETAIL 3 / SHEET C9.00
- PLANTING AREA PER LANDSCAPE PLANS
- DECOMPOSED GRANITE PER LANDSCAPE PLANS, DETAIL I / SHEET L1.51
- LIMITS OF WORK

20' 10' 0' 20' 40'

GRAPHIC SCALE
SCALE: 1" = 20'

Know what's below. Call before you dig.

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2	PRE-BID ADDENDUM	02.11.2022

KEYNOTES

LEGENDS

NOTES

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Consultant's Project No. 1HMC019600

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5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

HORIZONTAL CONTROL PLAN

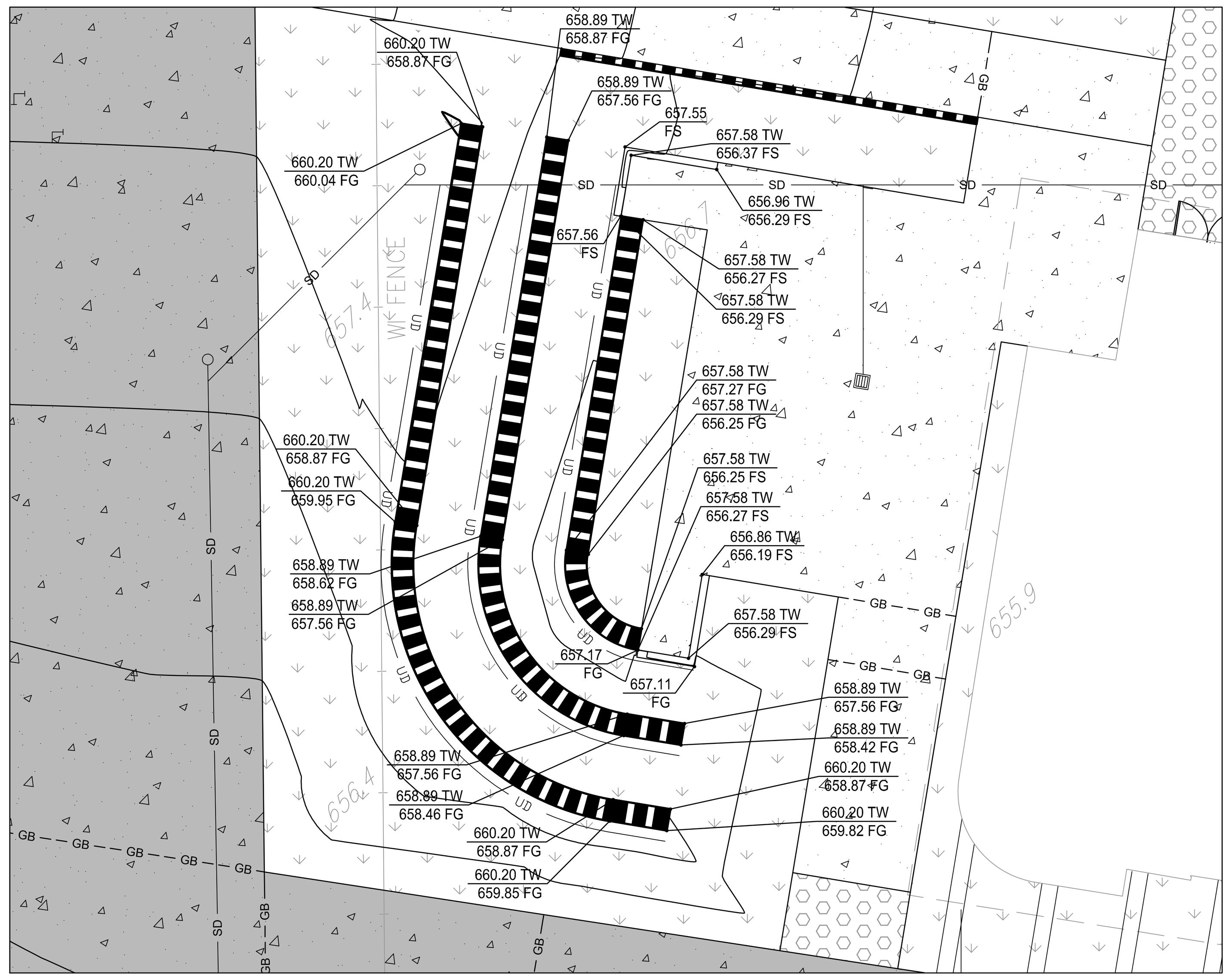
ADDENDUM #2

FILE NO.: 36-C1 A# : 04-119722

DATE: 07.16.2021 CLIENT PROJ NO:

SHEET:

C2.00

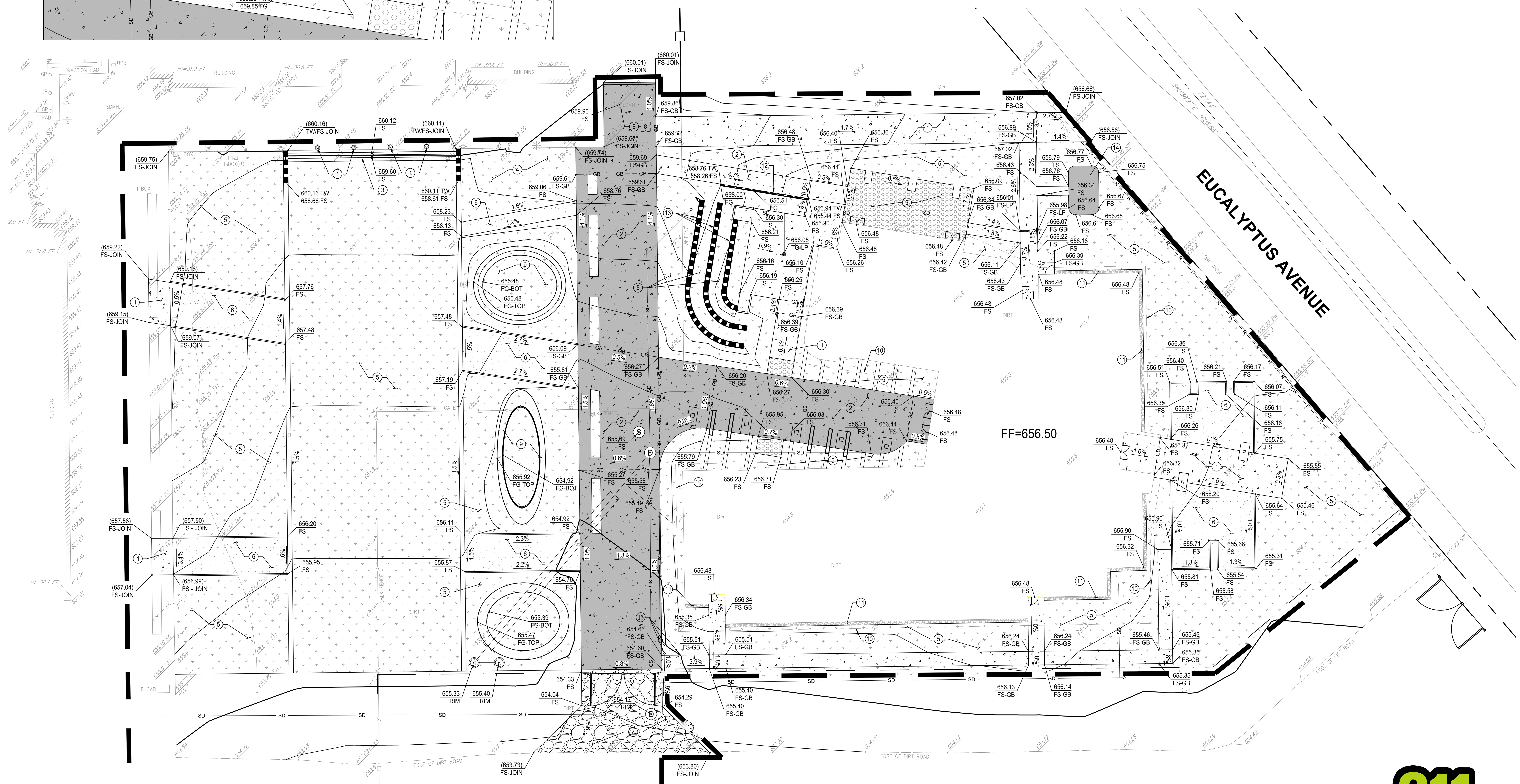


GRAPHIC SCALE
SCALE: 1" = 10'

CONSTRUCTION NOTES:

- CONSTRUCT
- EXISTING TO REMAIN -PROTECT IN PLACE
- EXISTING TO REMOVE
- REMOVE & RELOCATE
- ADJUST TO GRADE
- PER SEPARATE CONTRACT

1. CONCRETE WALKWAY PER DETAIL 1 / SHEET C9.00
2. CONCRETE PAVEMENT PER DETAIL
3. UNIT PAVERS PER LANDSCAPE PLANS, DETAIL G / SHEET L1.51
4. CONCRETE STAIR PER LANDSCAPE PLANS, DETAIL F / SHEET L.51
5. PLANTING AREA PER LANDSCAPE PLANS
6. DECOMPOSED GRANITE PER LANDSCAPE PLANS, DETAIL I / SHEET L1.51
7. FIRE ACCESS, STRUCTURAL SECTION PER DETAIL 3 / SHEET C9.00
8. MANHOLE
9. RAIN GARDEN PER LANDSCAPE PLANS
10. BUILDING OVEREXCAVATION PER GEOTECHNICAL REPORT
11. GRAVEL MAINTENANCE STRIP PER LANDSCAPE PLANS, DETAIL I / SHEET L3.51
12. CONCRETE RETAINING WALL PER LANDSCAPE PLANS, DETAIL P / SHEET L1.52
13. CONCRETE SEAT WALL PER LANDSCAPE PLANS, DETAIL E / SHEET L1.53
14. SUBSTATION CONCRETE PAD PER ELECTRICAL PLANS, DETAIL 4 / SHEET E5.12
15. BOLLARDS PER DETAIL 3 / SHEET C9.01



LEGEND

- CONCRETE PAVING PER DETAIL 1 / SHEET C9.00
- UNIT PAVERS PER LANDSCAPE PLANS, DETAIL 6 / SHEET L1.51
- COMPACTED FIRE ACCESS ROAD PER DETAIL 3 / SHEET C9.00
- PLANTING AREA PER LANDSCAPE PLANS
- HEAVY DUTY CONCRETE PAVING PER DETAIL 2 / SHEET C9.00
- DECOMPOSED GRANITE PER LANDSCAPE PLANS, DETAIL I / SHEET L1.51
- ELECTRICAL PAD PER ELECTRICAL PLANS, SHEET E1.21
- LIMITS OF WORK

GRAPHIC SCALE
SCALE: 1" = 20'

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PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
GRADING PLAN

ADDENDUM #2

FILE NO.: 36-C1 | A#: 04-119722
DATE: 02.03.2022 | CLIENT PROJ NO:

SHEET:
C3.00

PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY 1 INCH LONG WHEN PLOTTED ON 30X42 (ARCH D) SHEETS

NOTES FOR UNDERGROUND PIPING FOR PRIVATE HYDRANTS & SPRINKLERS

1. PRIOR TO INSTALLATION, ALL PLANS AND SPECIFICATIONS SHALL BE APPROVED BY DSA. REFER TO DSA IR A-25 FOR DESIGN, INSTALLATION AND MAINTENANCE GENERAL REQUIREMENTS.
2. INSPECTIONS ARE REQUIRED: 1) PRIOR TO POURING THRUST BLOCKS. 2) FOR HYDROSTATIC TESTING, AND 3) FOR FLUSH.
3. INSTALLATION, INSPECTION, AND TESTING SHALL CONFORM TO 2016 EDITIONS CFC, NFPA 13 AND NFPA 24.
4. PRIVATE FIRE HYDRANTS SHALL BE APPROVED WET BARREL STYLE WITH A MINIMUM OF ONE 2 1/2" AND ONE 4" OUTLET. THE 4" OUTLET SHALL FACE THE FIRE DEPARTMENT ACCESS ROAD. ALL OUTLETS SHALL BE PROVIDED WITH NATIONAL STANDARD THREADS (NST). NFPA 24, 7.1.1.2.
5. FIRE HYDRANT SUPPLY PIPING SHALL BE A MINIMUM OF SIX INCHES IN DIAMETER. THE CENTER OF THE HOSE OUTLET SHALL BE NOT LESS THAN 18" ABOVE FINAL GRADE OR, WHERE LOCATED IN A HOSE HOUSE, 12" ABOVE THE FLOOR. NFPA 24, 7.1.1 & 7.3.3.
6. FIRE HYDRANTS SHALL BE A MINIMUM OF 40 FEET FROM ALL STRUCTURES. NFPA 24, 7.2.3.
7. A KEYED GATE VALVE SHALL BE PROVIDED FOR EACH HYDRANT IN AN ACCESSIBLE LOCATION. VALVES SHALL NOT BE LOCATED IN PARKING STALLS. NFPA 24, 7.1.1.1
8. ALL PIPING SHALL BE LISTED FOR USE IN FIRE PROTECTION SERVICE AND COMPLY WITH AWWA STANDARDS (CLASS 150 MINIMUM) CLASS 200 PIPE SHALL BE USED WHERE THE PRESSURE MAY EXCEED 150 PSI. NFPA 24, 10.1.1
9. ALL BOLTED JOINTS SHALL BE CLEANED AND THOROUGHLY COATED WITH ASPHALT OR OTHER CORROSION RETARDING MATERIAL AFTER INSTALLATION. NFPA 24, 10.4.1.1
10. BACKFILL SHALL BE WELL TAMPED LAYERS TO CONSIST OF 6" MINIMUM BED OF CLEAN FILL SAND OR PEA GRAVEL BELOW AND 12" ABOVE THE PIPE (TOTAL 18" MINIMUM). NFPA 24, 10.9.1.
11. FITTINGS SHALL BE OF AN APPROVED TYPE. NFPA 24, 10.2.1.
12. A MINIMUM OF 30" OF COVER, FROM FINISH GRADE TO THE TOP OF THE PIPE, SHALL BE PROVIDED. WHEN SURFACE LOADS ARE EXPECTED, A MINIMUM OF 36" COVER SHALL BE PROVIDED. NFPA 24, 10.4.2.2.2 & 3
13. THRUST BLOCKS, OR OTHER APPROVED METHOD OF THRUST RESTRAINT, SHALL BE PROVIDED WHEREVER PIPE CHANGES DIRECTION. BACK-FILL BETWEEN THE JOINTS TO PREVENT MOVEMENT OF THE PIPE. PROVIDE DETAILS AND CALCULATIONS FOR SIZING THRUST BLOCKS BASE ON ACTUAL SOIL CONDITIONS. NFPA 24, 10.6.
14. A HYDROSTATIC TEST (200 PSI FOR TWO HOURS OR 50 PSI OVER MAXIMUM STATIC PRESSURE, WHICHEVER IS GREATER) SHALL BE PERFORMED. NFPA 24, 10.10.2.2.1.
15. THE SYSTEM SHALL BE THOROUGHLY FLUSHED BEFORE CONNECTION IS MADE TO OVERHEAD PIPING. FLOW SHALL BE THROUGH A MINIMUM OF 4" HOSE OF PIPE. NFPA 24, 10.10.2.1.
16. ALL CONTROL VALVES SHALL BE LOCKED IN THE OPEN POSITION. VALVES SHALL BE MONITORED IF THEY SERVE 6 OR MORE SPRINKLER HEADS. CBC/CFC 903.4.
17. ALL CONTROL VALVES SHALL BE LISTED INDICATING TYPE UNLESS A NON-INDICATING VALVE, SUCH AS AN UNDERGROUND GATE VALVE WITH APPROVED ROADWAY BOX COMPLETE WITH T-WRENCH, IS ACCEPTABLE TO AUTHORITY HAVING JURISDICTION (AHJ). NFPA 24, 6.1.1.
18. POST INDICATING VALVES (PIV) SHALL BE TESTED TO INSURE THAT THE "TARGETS" (OPEN, CLOSED) ARE CLEARLY IDENTIFIED WHEN VALVE IS OPENED AND CLOSED. NFPA 24, 10.10.1 & 14.1.
19. TESTS SHALL BE MADE BY THE INSTALLING CONTRACTOR IN THE PRESENCE OF THE (AHJ). PROVIDE A COMPLETED CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR UNDERGROUND PIPING TO DSA. NFPA 24, 10.10.1 & 14.1, CFC 901.5 & 6.
20. ALL FIRE HYDRANTS SHALL HAVE A 3-FOOT CIRCUMFERENCE OF CLEAR SPACE AND AN 18 INCH CLEARANCE FROM THE CENTER OF THE 4½" DISCHARGE TO FINISHED GRADE LEVEL. CFC 507.5.5
21. THE POST INDICATOR VALVES (PIV) SHALL BE SET SO THAT THE TOP OF THE POST WILL BE 32" TO 40" ABOVE FINISHED GRADE. NFPA 24, 6.3.1
22. ALL FIRE HYDRANTS SHALL BE INSTALLED WITH BREAK-OFF BOLTS AND/OR BREAK-OFF SPOOLS.
23. ALL MECHANICAL JOINTS ON FIRE SERVICE LINES AND FIRE SPRINKLER LATERALS SHALL BE CLEANED AND THOROUGHLY COATED WITH CORROSION RETARDING MATERIAL. NFPA 24, 10.4.1.

CONSTRUCTION NOTES:

- CONSTRUCT
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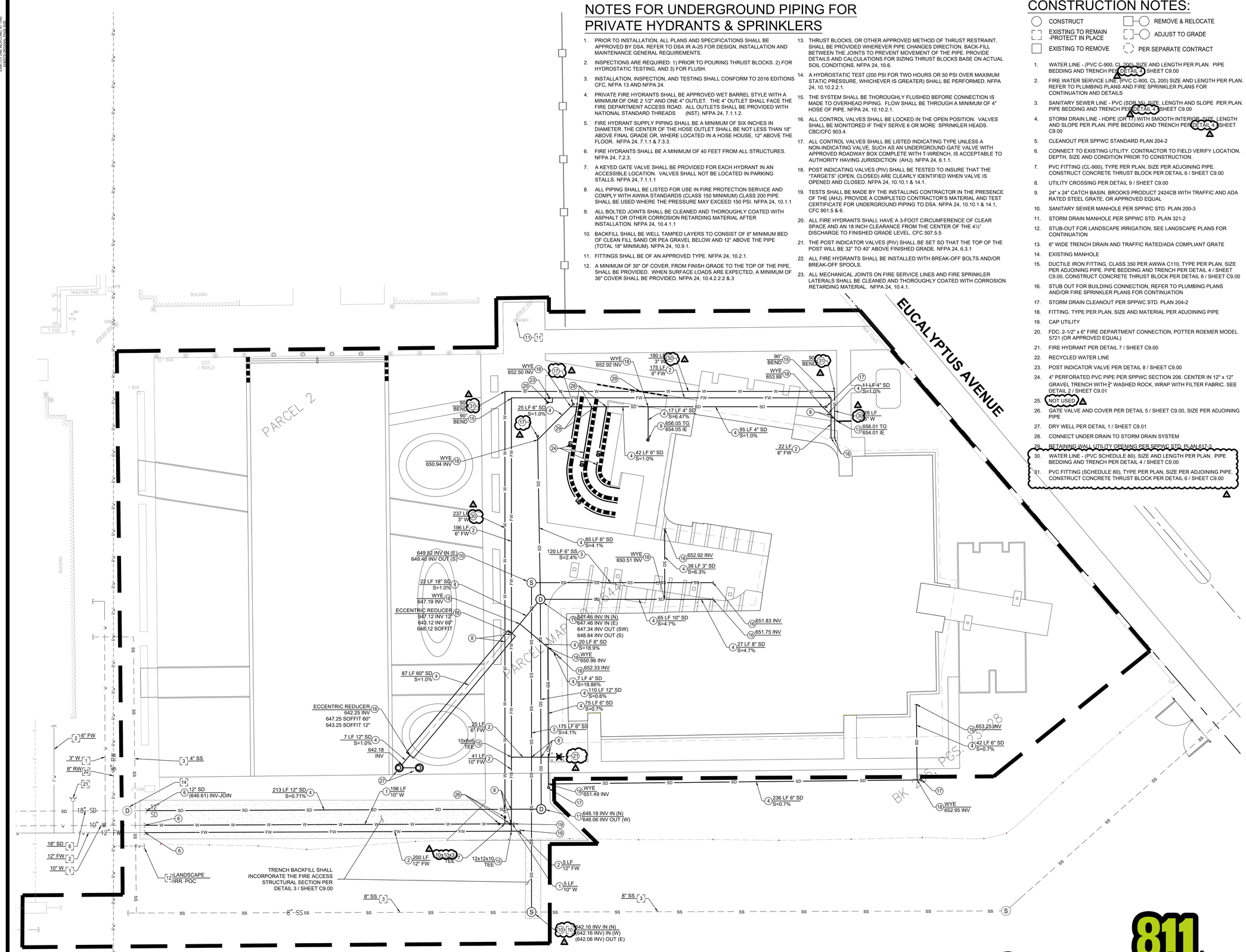
1. WATER LINE - (PVC C-900, CL 200) SIZE AND LENGTH PER PLAN. PIPE BEDDING AND TRENCH PER DETAIL 4 / SHEET C9.00
2. FIRE WATER SERVICE LINE - (PVC C-900, CL 200) SIZE AND LENGTH PER PLAN. REFER TO PLUMBING PLANS AND FIRE SPRINKLER PLANS FOR CONTINUATION AND DETAILS
3. SANITARY SEWER LINE - PVC (SDR-35) SIZE, LENGTH AND SLOPE PER PLAN. PIPE BEDDING AND TRENCH PER DETAIL 4 / SHEET C9.00
4. STORM DRAIN LINE - HDPE (DR 17) WITH SMOOTH INTERIOR, SIZE, LENGTH AND SLOPE PER PLAN. PIPE BEDDING AND TRENCH PER DETAIL 4 / SHEET C9.00
5. CLEANOUT PER SPPWC STANDARD PLAN 204-2
6. CONNECT TO EXISTING UTILITY. CONTRACTOR TO FIELD VERIFY LOCATION, DEPTH, SIZE AND CONDITION PRIOR TO CONSTRUCTION.
7. PVC FITTING (CL-900), TYPE PER PLAN, SIZE PER ADJOINING PIPE. CONSTRUCT CONCRETE THRUST BLOCK PER DETAIL 6 / SHEET C9.00
8. UTILITY CROSSING PER DETAIL 9 / SHEET C9.00
9. 24" x 24" CATCH BASIN. BROOKS PRODUCT 2424CB WITH TRAFFIC AND ADA RATED STEEL GRATE, OR APPROVED EQUAL
10. SANITARY SEWER MANHOLE PER SPPWC STD. PLAN 200-3
11. STORM DRAIN MANHOLE PER SPPWC STD. PLAN 321-2
12. STUB-OUT FOR LANDSCAPE IRRIGATION, SEE LANDSCAPE PLANS FOR CONTINUATION
13. 6" WIDE TRENCH DRAIN AND TRAFFIC RATED/ADA COMPLIANT GRATE
14. EXISTING MANHOLE
15. DUCTILE IRON FITTING, CLASS 350 PER AWWA C110, TYPE PER PLAN, SIZE PER ADJOINING PIPE. PIPE BEDDING AND TRENCH PER DETAIL 4 / SHEET C9.00, CONSTRUCT CONCRETE THRUST BLOCK PER DETAIL 6 / SHEET C9.00
16. STUB OUT FOR BUILDING CONNECTION, REFER TO PLUMBING PLANS AND/OR FIRE SPRINKLER PLANS FOR CONTINUATION
17. STORM DRAIN CLEANOUT PER SPPWC STD. PLAN 204-2
18. FITTING. TYPE PER PLAN, SIZE AND MATERIAL PER ADJOINING PIPE
19. CAP UTILITY
20. FDC: 2-1/2" x 6" FIRE DEPARTMENT CONNECTION, POTTER ROEMER MODEL 5721 (OR APPROVED EQUAL)
21. FIRE HYDRANT PER DETAIL 7 / SHEET C9.00
22. RECYCLED WATER LINE
23. POST INDICATOR VALVE PER DETAIL 8 / SHEET C9.00
24. 4" PERFORATED PVC PIPE PER SPPWC SECTION 206. CENTER IN 12" x 12" GRAVEL TRENCH WITH ¾" WASHED ROCK, WRAP WITH FILTER FABRIC. SEE DETAIL 2 / SHEET C9.01
25. NOT USED
26. GATE VALVE AND COVER PER DETAIL 5 / SHEET C9.00, SIZE PER ADJOINING PIPE
27. DRY WELL PER DETAIL 1 / SHEET C9.01
28. CONNECT UNDER DRAIN TO STORM DRAIN SYSTEM
29. RETAINING WALL UTILITY OPENING PER SPPWC STD. PLAN 617-3
30. WATER LINE - (PVC SCHEDULE 80), SIZE AND LENGTH PER PLAN. PIPE BEDDING AND TRENCH PER DETAIL 4 / SHEET C9.00
31. PVC FITTING (SCHEDULE 80), TYPE PER PLAN, SIZE PER ADJOINING PIPE. CONSTRUCT CONCRETE THRUST BLOCK PER DETAIL 6 / SHEET C9.00



20' 10' 0' 20' 40'

GRAPHIC SCALE
SCALE: 1" = 20'

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5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

UTILITY PLAN

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 02.03.2022 | CLIENT PROJ NO:

SHEET:

C4.00

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH (25d) AT THIS ORIGINAL PLOTTED SIZE

CONSTRUCTION NOTES

1. REFERENCES OF THE A.S.T.M.S. AND THE CALIFORNIA BUILDING CODE SHALL BE TO THE LATEST EDITIONS AS ADOPTED BY LOCAL JURISDICTION.
2. REFER TO CITY AND COUNTY STANDARDS FOR STANDARD PLANS AND SPECIFICATIONS WHERE APPLICABLE
3. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATION GRADES, EXISTING STRUCTURES, SPECIFICATIONS AND FIELD CONDITIONS AT THE SITE BEFORE COMMENCING WORK. WHERE CONFLICTS OCCUR, NOTIFY OWNER'S AUTHORIZED REPRESENTATIVE FOR CLARIFICATION. FAILURE TO PROVIDE SUCH NOTIFICATION MAY MAKE CONTRACTOR LIABLE FOR COSTS INCURRED TO RECTIFY THE DISCREPANCY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONSULT WITH GENERAL CONTRACTOR AND DRAWINGS FOR VERIFYING LOCATIONS OF UNDERGROUND UTILITIES, PIPES, AND RELATED STRUCTURES. THE CONTRACTOR SHALL TAKE SOLE RESPONSIBILITY FOR COSTS INCURRED DUE TO DAMAGE OF SAID UTILITIES IF PROPER VERIFICATION WAS NOT PERFORMED.
5. AREAS WITHIN SCOPE OF WORK SHALL BE TREATED WITH CONTACT HERBICIDE TEN (10) DAYS PRIOR TO START OF WORK. VERIFY WITH LANDSCAPE ARCHITECT.
6. AREAS TO BE GRADED OR PAVED SHALL BE GRUBBED AND STRIPPED OF ALL VEGETATION, DEBRIS, AND OTHER DELETERIOUS MATERIAL. ALL LOOSE SOIL DISTURBED BY REMOVAL OF TREES, EXISTING FILL AND LOOSE OR DISTURBED TOPSOIL SHALL BE REMOVED.
7. PLANS ARE FOR THE PURPOSE OF HORIZONTAL CONTROL (STAKING) OF CONSTRUCTION FEATURES NOT LOCATED BY THE PROJECT CIVIL ENGINEER OR ARCHITECTURAL DRAWINGS AND FOR CONSTRUCTION REFERENCE OF SITE CONSTRUCTION FEATURES DETAILED HEREIN.
8. ALL DIMENSIONS ARE STAKED PERPENDICULAR OR PARALLEL, UNLESS OTHERWISE INDICATED.
9. CONTRACTOR SHALL ENSURE THAT FINE GRADES HAVE BEEN SET CORRECTLY PRIOR TO INSTALLING WALKS, FOOTINGS, WALLS, AND OTHER STRUCTURES.
10. CONTRACTOR SHALL ENSURE THAT DRAINLINES, ELECTRICAL CONDUITS, SLEEVES, ETC., ARE IN PLACE PRIOR TO INSTALLATION OF PAVING AND WALLS
11. ENSURE THAT CURVED EDGES HAVE SMOOTH AND CONTINUOUS CURVES.
12. CONTRACTOR SHALL SUBMIT A CONCRETE FLATWORK JOINTING PLAN SHOWING ISOLATION AND CONTRACTION JOINTS BASED ON DESIGN PER PLAN - FOR LANDSCAPE ARCHITECT APPROVAL.
13. CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT FOR HARDSCAPE FORM REVIEW, APPROVAL BEFORE POURING CONCRETE.
14. WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALING OF DRAWINGS.
15. TYPICAL DETAILS SHALL APPLY IN GENERAL CONSTRUCTION WHERE NO DETAILS ARE GIVEN. THE CONSTRUCTION SHALL BE AS FOR SIMILAR WORK. OMISSIONS, AND/OR FIELD CONDITIONS, SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT BEFORE PROCEEDING WITH THE WORK SO INVOLVED.
16. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REFER TO PLANTING PLANS TO DETERMINE LOCATION OF SPECIMEN TREES AND TO ROUTE UNDERGROUND STRUCTURES AROUND THESE LOCATIONS
17. IMPORT SOIL SHALL BE APPROVED ON SITE BY OWNER'S REPRESENTATIVE. REFER TO SPECIFICATIONS FOR SOIL REQUIREMENTS. SOIL SHALL BE FREE FROM ROCK, DEBRIS, NUT GRASS, BERMUDA GRASS OR OTHER DELETERIOUS MATERIAL.
18. CONCRETE SHALL BE TRANSIT MIXED FROM A LICENSED BATCHING PLANT, WHICH SHALL BE 2500 P.S.I. AT 28 DAYS. ALL EXPOSED FINISHED CONCRETE SHALL HAVE A COLOR ADDITIVE. COLOR AND STRENGTH TO BE SELECTED BY LANDSCAPE ARCHITECT. CONTRACTOR SHALL SUBMIT A 5'X5' SAMPLE OF FINISHED CONCRETE TO LANDSCAPE ARCHITECT FOR APPROVAL.
19. REINFORCING STEEL: A.S.T.M. A-615, GRADE 40 FOR ALL REINFORCING. MINIMUM CLEARANCE FOR BARS SHALL BE 3" AT BOTTOM OF FOOTING AND 1 1/2" AT BOTTOM OF SLABS ON GRADE.
20. SLEEVES: CONCRETE CONTRACTOR SHALL PROVIDE PVC UNDER PAVING. THE LOCATIONS SHALL BE COORDINATED WITH THE ELECTRIC CONTRACTOR AND IRRIGATION CONTRACTOR.
21. MORTAR SHALL BE 1: 3 1/2 : 1/4 TO 1/2 PARTS BY VOLUME OF PORTLAND CEMENT, TO MORTAR SAND, TO LIME PUTTY. USE NO FIRE CLAY, ADD 1 PINT ADMIXTURE PER SACK OF CEMENT TO INHIBIT EFFLORESCENCE.
22. USE AT LEAST A 1-SACK MIXER. MEASURE PARTS BY VOLUME FOR UNIFORMITY.
    A. FOR MORTAR, LOAD MORTAR SAND, PORTLAND CEMENT, ADMIXTURE, AND WATER INTO MIXER IN THAT ORDER, AND MIX FOR 3 MINUTES THEN ADD LIME PUTTY AND MIX ADDITIONAL 10 MINUTES.
    B. FOR GROUT, LOAD PEA GRAVEL, IF USED, SAND, PORTLAND CEMENT, ADMIXTURE, AND WATER INTO THE MIXER FOR 3 MINUTES. USE ENOUGH WATER TO FORM A POURING CONSISTENCY AND COLOR PER PLANS.
    C. DO NOT USE ANY MORTAR OR GROUT AFTER MORE THAN 1 1/2 HOURS OF ITS INITIAL MIXING, EXCEPT MORTAR MAY BE RE-TEMPERED.
23. EXCESS SOIL SHALL BE REMOVED FROM SITE.
24. REPLACE OR REPAIR EXISTING MATERIAL THAT ARE DAMAGED BY CONTRACTOR DURING CONSTRUCTION OPERATIONS.
25. REFER TO MASTER CONSTRUCTION LEGEND FOR ADDITIONAL INFORMATION.

DEMOLITION NOTES

1. CONTRACTOR IS RESPONSIBLE FOR COMPLETE REMOVAL FROM SITE ALL MATERIAL UNLESS SPECIFIED ON THE CONSTRUCTION DOCUMENTS TO REMAIN, TO BE STORED ON SITE OR TURNED OVER TO CAMPUS. SUCH MATERIALS INCLUDE BUT ARE NOT LIMITED TO; CONCRETE CURBS, ASPHALT CONCRETE, CONCRETE PAVING, CATCH BASINS, TREES AND SHRUBS, IRRIGATION VALVES, PIPING AND WIRING, CLEARING AND GRUBBING OF PLANT MATERIAL, POSTS, FIXTURES, FURNISHINGS, ANY FOUNDATIONS, AND OTHER MISCELLANEOUS OBJECTS NOT PERTINENT TO THE FINAL DESIGN. CONTRACTOR SHALL CLEAR SITE OF ANY REMAINING DEBRIS NOT IN STORAGE PRIOR TO BEGINNING NEW CONSTRUCTION. ALL DEBRIS SHALL BE LEGALLY DISPOSED IN ACCORDANCE WITH THE SPECIFICATIONS AND ACCEPTED STANDARD PRACTICES.
2. CONTRACTOR TO PROCURE CITY, COUNTY, AND STATE PERMITS AND LICENSES, INCLUDING MUNICIPAL BUSINESS LICENSE, AND PAY ALL CHARGES AND FEES FOR THE SAME WITHOUT COST TO THE CAMPUS IF REQUIRED.
3. CONTRACTOR IS RESPONSIBLE FOR INVESTIGATING AND LOCATING EXISTING UTILITIES PRIOR TO ANY DEMOLITION AND IS RESPONSIBLE FOR DAMAGE TO UTILITIES. NOTIFY USA ALERT @ 800-422-4133 (72) HOURS PRIOR TO START OF WORK.
4. CONTRACTOR SHALL PROTECT ALL EXISTING CONSTRUCTION, MATERIALS AND PLANT MATERIAL TO REMAIN DURING DEMOLITION AND IS RESPONSIBLE FOR REPLACEMENT OR REPAIR OF ANY DAMAGED MATERIAL NOT SPECIFIED FOR REMOVAL.
5. CONTRACTOR SHALL REPORT ANY POTENTIAL PROBLEMS OR DISCREPANCIES TO THE CAMPUS AND LANDSCAPE ARCHITECT PRIOR TO COMMENCING ANY DEMOLITION WORK. DO NOT WILLFULLY PROCEED WITH WORK AS SHOWN WHEN IT IS OBVIOUS THAT CONDITIONS AND/OR OBJECTS EXIST THAT MAY NOT HAVE BEEN KNOWN DURING DESIGN. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR ALL NECESSARY REVISIONS DUE TO FAILURE TO GIVE SUCH NOTIFICATION.
6. CONTRACTOR SHALL SECURE THE CONSTRUCTION SITE FOR THE ENTIRE LENGTH OF THE CONSTRUCTION PERIOD, INCLUDING THE MAINTENANCE PERIOD, WITH A 6' HIGH TEMPORARY CHAIN LINK FENCE. LOCATION OF FENCE AND GATES SHALL BE AS SHOWN BY THE LIMIT-OF-WORK LINE ON PLAN.
7. CONTRACTOR IS RESPONSIBLE FOR ALL EROSION CONTROL ON THE CONSTRUCTION SITE, DURING CONSTRUCTION AND THROUGH THE MAINTENANCE PERIODS.
8. REMOVE OR DISPOSE OF CRUSHED ROCK, ASPHALT, CONCRETE, CURBS, GUTTER, AND DEBRIS ON GROUND SURFACE PER PLAN.
9. BREAK UP AND REMOVE EXISTING CONCRETE TO INDICATED LIMITS. CUT NEAT AND EVEN LINES WITH A CONCRETE CUTTING SAW. MINIMUM DEPTH OF CUT SHALL BE 1-1/2 INCHES, UNLESS OTHERWISE REQUIRED. REMOVE CONCRETE BROKEN BEYOND THE INDICATED LIMITS TO THE NEAREST JOINT OR SCORE LINE AND REPLACE WITH NEW CONCRETE TO MATCH EXISTING. REMOVED CONCRETE SHALL BE STOCKPILED IN SPECIFIED LOCATION SPECIFIED BY THE DRAWINGS FOR LATER USE AS BROKEN CONCRETE PAVING.
10. ALL MATERIALS SPECIFIED TO BE REMOVED SHALL BE LEGALLY DISPOSED OF OFF-SITE PER LOCAL CODES AND REGULATIONS.
11. CONTROL DUST AND NOISE DURING DEMOLITION OPERATIONS, PER LOCAL CODES. EXCESSIVE BLOWING DUST AND DEBRIS WILL NOT BE PERMITTED AT ANY TIME.
12. CONDUCT DEMOLITION WORK IN ACCORDANCE WITH APPLICABLE SAFETY REQUIREMENTS OF THE CALIFORNIA ADMINISTRATIVE CODE, TITLE 19, THE LATEST CONSTRUCTION SAFETY ORDERS OF THE DIVISION OF INDUSTRIAL SAFETY, STATE OF CALIFORNIA, THE ASSOCIATED GENERAL CONTRACTORS' MANUAL OF ACCIDENT PREVENTION IN CONSTRUCTION, LATEST EDITION, AND THE APPLICABLE REQUIREMENTS OF THE CALIFORNIA BUILDING CODE, LATEST EDITION.

TREE PROTECTION NOTES

1. TRIMMING AND PRUNING SHALL BE PERFORMED ONLY UNDER THE SUPERVISION OF THE OWNER OR ARBORIST OF RECORD.
2. CHAIN LINK FENCING, FIVE (5) FEET IN HEIGHT, WILL BE SECURED TO TWO-INCH DIAMETER GALVANIZED IRON POSTS SPACED NO MORE THAN TEN FEET APART AS DELINEATED ON THE TREE PROTECTION PLAN. A TWO (2) FOOT WIDE ACCESS GATE IS PERMITTED. INSTALLATION OF PROTECTION FENCING IS THE RESPONSIBILITY OF THE CONTRACTOR. PARKING OR STORING OF VEHICLES, TRAILERS, EQUIPMENT, MACHINERY OR CONSTRUCTION MATERIALS WILL NOT BE PERMITTED WITHIN AREAS DELINEATED BY PROTECTIVE FENCES, NOR WILL DUMPING OF OILS OR CHEMICALS.
3. FENCES ARE CRITICAL TO (1) PREVENT DIRECT CONTACT AND DAMAGE TO THE CANOPY, BRANCHES, AND TRUNK, (2) PRESERVE ROOTS AND SOIL IN AN INTACT AND NON-COMPACTED STATE, AND (3) IDENTIFY THE TREE PROTECTION ZONE. THE TREE PROTECTION FENCE SHALL BE CONTINUOUSLY MAINTAINED AND REPAIRED AS NECESSARY THROUGHOUT THE CONSTRUCTION PERIOD AND REMAIN IN PLACE UNTIL FINAL LANDSCAPE WORK COMMENCES.
4. DURING THE COURSE OF CONSTRUCTION, RELOCATION OF THE FENCE MAY BE REQUIRED TO ACCOMMODATE CONSTRUCTION. THE CONTRACTOR MAY DO SO WITH THE APPROVAL OF THE OWNER OR ARBORIST OF RECORD AT NO ADDITIONAL EXPENSE.
5. DURING THE COURSE OF CONSTRUCTION THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT THE EXISTING TREES FROM INJURY. THE ROOTS, TRUNKS, AND FOLIAGE OF ALL EXISTING TREES SHALL BE PROTECTED. THE CONTRACTOR SHALL KEEP THE SITE AREA AROUND ALL EXISTING TREES FREE FROM DEBRIS AT ALL TIMES.
6. TREES SUBJECT TO THE PROVISIONS OF THESE REQUIREMENTS THAT HAVE BEEN INJURED FOR ANY REASON SHALL BE REPAIRED IMMEDIATELY BY THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE. REPAIR SHALL INCLUDE REMOVAL OF ROUGH BARK EDGES AND SEVERELY INJURED BRANCHES AS DIRECTED BY THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE.
    A. APPROVAL BY THE OWNER FOR WORK WITHIN THE FENCED AREA SHALL NOT RELEASE THE CONTRACTOR FROM ANY REQUIREMENT TO PROTECT EXISTING TREES TO BE PRESERVED.
    B. DURING THE COURSE OF CONSTRUCTION WITHIN THE FENCED AREA, NO ROOTS LARGER THAN TWO (2) INCHES IN DIAMETER SHALL BE CUT WITHOUT PRIOR APPROVAL FROM THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE.
7. DURING CONSTRUCTION, THE EXISTING DRAINAGE PATTERNS SHALL NOT BE ALTERED WITHIN THE AREA OF THE DRIPLINE.
8. THE FOLLOWING IS NOT PERMITTED WITHIN THE DRIPLINE OF ANY EXISTING TREE TO BE PRESERVED:
    A. STORAGE OR PARKING OF AUTOMOBILES OR OTHER VEHICLES.
    B. STOCKPILING OF BUILDING MATERIALS OR REFUSE OF EXCAVATED MATERIALS.
    C. SKINNING OR BRUISING OF BARK.
    D. USE OF TREES AS SUPPORT POSTS, POWER POLES, OR SIGNPOSTS; ANCHORAGE FOR ROPES, GUY WIRES, POWER LINES, OR OTHER SIMILAR FUNCTIONS.
    E. DUMPING OF POISONOUS MATERIALS ON OR AROUND TREES AND ROOTS. SUCH MATERIAL INCLUDES BUT IS NOT LIMITED TO PAINT, PETROLEUM PRODUCTS, CONTAMINATED WATER, OR OTHER DELETERIOUS MATERIALS.
    F. CUTTING OF TREE ROOTS BY UTILITY TRENCHING, FOUNDATION DIGGING, PLACEMENT OF CURBS AND TRENCHES, AND OTHER MISCELLANEOUS EXCAVATION WITHOUT PRIOR APPROVAL OF THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE.
    G. DAMAGE TO TRUNK, LIMBS, OR FOLIAGE CAUSED BY MANEUVERING VEHICLES.
    H. COMPACTION OF THE ROOT ZONE UNDER THE DRIPLINE BY THE MOVEMENT OF TRUCKS OR GRADING MACHINES; STORAGE OF EQUIPMENT, GRAVEL, EARTH FILL, OR CONSTRUCTION SUPPLIES, ETC.
    I. EXCESSIVE WATER OR HEAT FROM EQUIPMENT, UTILITY LINE CONSTRUCTION, OR BURNING OF TRASH UNDER OR NEAR SHRUBS OR TREES.
    J. DAMAGE TO ROOT SYSTEM FROM FLOODING, EROSION, AND EXCESSIVE WETTING AND DRYING RESULTING FROM DEWATERING AND OTHER OPERATIONS.
9. EXCAVATION AROUND TREES:
    A. EXCAVATION WITHIN DRIPLINES SHALL BE DONE ONLY WHERE ABSOLUTELY NECESSARY.
    B. WHEN TRENCHING FOR UTILITIES IS REQUIRED WITHIN DRIPLINES, TUNNELING UNDER AND AROUND ROOTS OR BRIDGING OVER THEM IS PREFERRED OVER ROOT SEVERANCE. MAIN BUTTRESS, OR SUPPORTIVE ROOTS, SHALL NOT BE CUT. SMALLER ROOTS THAT INTERFERE WITH INSTALLATION OF NEW WORK MAY BE CUT WITH PRIOR APPROVAL OF THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE.
    C. WHERE EXCAVATION FOR NEW CONSTRUCTION IS REQUIRED WITHIN DRIPLINES OF TREES, HAND EXCAVATION SHALL BE EMPLOYED TO MINIMIZE DAMAGE TO ROOT SYSTEMS. IF LARGE, MAIN LATERAL ROOTS ARE ENCOUNTERED, THEY SHALL BE EXPOSED BEYOND THE EXCAVATION LIMITS AS REQUIRED TO BEND AND RELOCATE THEM WITHOUT BREAKING. ANY ROOTS 2-INCHES OR LARGER WHICH MIGHT BE SEVERED WILL BE CLEANLY CUT BEHIND TORN ENDS TO ENHANCE THE EFFICIENT NATURAL "COMPARTMENTALIZATION" OF THE DAMAGE BY THE ROOTS. THERE IS NO NEED TO APPLY ANY TYPE OF "PRUNING SEAL" COMPOUND WHEN ROOTS ARE CLEANLY CUT, SINCE THE ROOT WILL FORM ITS OWN INTERNAL BARRIERS TO DECAY.
    D. EXPOSED ROOTS SHALL NOT BE ALLOWED TO DRY OUT BEFORE PERMANENT BACKFILL IS PLACED. TEMPORARY EARTH COVER SHALL BE PROVIDED, OR ROOTS SHALL BE PACKED WITH WET PEAT MOSS OR FOUR LAYERS OF WET, UNTREATED BURLAP, AND TEMPORARILY SUPPORTED AND PROTECTED FROM DAMAGE UNTIL PERMANENTLY COVERED WITH BACKFILL. THE COVER OVER THE ROOTS SHALL BE WETTED TO THE POINT OF RUNOFF DAILY.
10. TRIMMING OF TREES (WHEN INDICATED AS WORK INCLUDED IN CONTRACT, OR WHEN PRUNING IS REQUIRED AS AN APPROVAL HAS BEEN GRANTED BY THE OWNER TO ACCOMMODATE CONSTRUCTION):
    A. BRANCHES SHALL BE THINNED IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARDS INSTITUTE STANDARD PRACTICES FOR PRUNING (ANSI A300)
    B. THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE SHALL BE ENGAGED TO OVERSEE REMOVAL OF BRANCHES FROM TREES AND LARGE SHRUBS WHICH ARE TO REMAIN.
    C. IN THE CASE OF ROOT CUTS, APPLY WET BURLAP OR OTHER PROTECTION TO PREVENT DRYING OUT, AND MAINTAIN IN A MOIST CONDITION UNTIL PERMANENT BACKFILL IS IN PLACE.
11. SOIL COMPACTION MITIGATION:
    A. THE CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLING ANY ROOT BUFFER MATERIAL SUCH AS MULCH, GRAVEL, OR PLYWOOD. THE CONTRACTOR IS RESPONSIBLE FOR ITS MAINTENANCE TO ASSURE EFFECTIVENESS AGAINST SOIL COMPACTION.
12. REPAIR COMPENSATION:
    A. DAMAGE TO EXISTING CROWNS OR ROOTS OVER TWO (2) INCHES IN DIAMETER SHALL BE IMMEDIATELY REPORTED TO THE OWNER, IN WRITING, AND REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE BY THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE.
    B. THE ARBORIST OF RECORD OR AUTHORIZED REPRESENTATIVE SHALL DIRECT THE REPAIR OF TREES DAMAGED BY CONSTRUCTION OPERATIONS. REPAIRS SHALL BE MADE PROMPTLY AFTER DAMAGE OCCURS TO PREVENT PROGRESSIVE DETERIORATION OF DAMAGED TREES.
    C. ANY TREE TO REMAIN WHICH IS DAMAGED OR DESTROYED OWING TO THE CONTRACTOR'S FAILURE TO PROVIDE ADEQUATE PROTECTION SHALL BE COMPENSATED FOR IN ACCORDANCE WITH THE GUIDELINES SET FORTH IN THE GUIDE FOR PLANT APPRAISAL, 9TH EDITION, USING THE TRUNK FORMULA METHOD.
        1. FOR TREES AND SHRUBS WITH DIAMETERS UP TO AND INCLUDING 6 INCHES, COMPENSATION SHALL BE THE ACTUAL COST OF REPLACEMENT WITH ITEM SIMILAR IN SPECIES, SIZE, AND SHAPE, INCLUDING, BUT NOT LIMITED TO:
            A. ACTUAL COST OF REPLACEMENT TREE.
            B. TRANSPORTATION OR DELIVER OF BOXED TREE TO SITE.
            C. PLANTING AND STAKING (OR GUYING).
            D. ESTABLISHMENT PERIOD MAINTENANCE FOR AT LEAST 90 DAYS, INCLUDING WATERING, PRUNING, PEST CONTROL, OR OTHER CARE TO BRING REPLACEMENT TO THE SAME GENERAL CONDITION OF THE ORIGINAL TREE.
    D. DAMAGED TREE LIMBS OR TREES WHICH HAVE DIED AS A RESULT OF INJURY DURING CONSTRUCTION SHALL REMAIN OR BE REMOVED BY THE CONTRACTOR AS DIRECTED BY THE OWNER OR ARBORIST OF RECORD.

MASTER CONSTRUCTION LEGEND

ITEM	DESCRIPTION	MANUFACTURER	MATERIAL/MODEL	COLOR	FINISH	NOTES	DETAIL
PAVING LEGEND							
P-1	CONCRETE PAVING (PEDESTRIAN)	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	PROVIDE 5'X5' SAMPLE	DETAIL A SHEET L1.51
P-2	CONCRETE PAVING (VEHICULAR)	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	SEE CIVIL FOR SUB-BASE	DETAIL E SHEET L1.51
P-3	CONCRETE BAND AT QUAD EDGE	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	-	DETAIL J SHEET L1.51
P-4	CONCRETE SAWCUT JOINT	-	-	-	-	-	DETAIL D SHEET L1.51
P-5	CONCRETE MOW CURB	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	-	DETAIL H SHEET L1.51
P-6	UNIT PAVERS	BELGARD 844.495.8210	MODULINE PAVER- 3x12" (60MM)	LINEN (LIGHTER GREY)	GROUND FACE	IN STOCK - RUNNING BOND PATTERN	DETAIL G SHEET L1.51
P-7	UNIT PAVERS	BELGARD 844.495.8210	MODULINE PAVER- 3x12" (60MM)	FOUNDRY (DARKER GREY)	GROUND FACE	IN STOCK - RUNNING BOND PATTERN	DETAIL G SHEET L1.51
P-8	DECOMPOSED GRANITE (STABILIZED)	SOUTHWEST BOULDER AND STONE - 714.882.1010	STABILIZED DECOMPOSED GRANITE	CALIFORNIA GOLD	-	DG AROUND TREES TO BE UNSTABILIZED WITHIN 24" OF TRUNK	DETAIL I SHEET L1.51
P-9	CONCRETE STAIRS - QUAD	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	-	DETAIL F SHEET L1.51
P-10	SLOPED CONCRETE WALKWAY	-	P.I.P. CONCRETE	NATURAL GREY	TOP CAST #5	-	DETAIL A SHEET L1.51
P-11	JOINT AT NEW AND EXISTING CONCRETE	-	-	-	-	-	DETAIL N SHEET L1.51
WALLS AND FENCE LEGEND							
W-1	SEAT WALL AT QUAD STEPS	-	P.I.P. CONCRETE	NATURAL GREY	SMOOTH TROWEL FINISH WITH ACID ETCH	MAKE SINGLE 12X12 CUBE MOCKUP FOR APPROVAL OF BENCHWALL FINISH. STRIP FORMS AND FINISH, NO SACKING ACCEPTED.	DETAIL P SHEET L1.51
W-2	RETAINING WALL AT WHEELCHAIR SPACE AT AMPHITHEATER	-	P.I.P. CONCRETE	NATURAL GREY	SMOOTH TROWEL FINISH WITH ACID ETCH	WITH SKATE DETERRENT: HEMI GRINDERMINDER	DETAILS F/L1.52 & G/L1.53
W-3	CHAINLINK FENCE	-	9 GAUGE, 2" OPENING	-	GALVANIZED	-	DETAIL L SHEET L1.52
W-4	CHAINLINK GATE FOR EMERGENCY ACCESS	-	9 GAUGE, 2" OPENING	-	GALVANIZED	-	DETAIL D SHEET L1.52
W-5	RETAINING WALL AT SLOPED WALK	-	P.I.P. CONCRETE	NATURAL GREY	SMOOTH TROWEL FINISH WITH ACID ETCH	MAKE SINGLE 12X12 CUBE MOCKUP FOR APPROVAL OF BENCHWALL FINISH. STRIP FORMS AND FINISH, NO SACKING ACCEPTED.	DETAIL P SHEET L1.52
SITE AMENITIES LEGEND							
SA-1	CONCRETE BENCHES - ENTRY COURTYARD	-	P.I.P. CONCRETE	NATURAL GREY	SMOOTH TROWEL FINISH WITH ACID ETCH	WITH SKATE DETERRENT: HEMI GRINDERMINDER	DETAILS E & L SHEET L1.53
SA-2	CONCRETE BENCHES - AMPHITHEATER	-	P.I.P. CONCRETE	NATURAL GREY	SMOOTH TROWEL FINISH WITH ACID ETCH	MAKE SINGLE 12X12 CUBE MOCKUP FOR APPROVAL OF BENCHWALL FINISH. STRIP FORMS AND FINISH, NO SACKING ACCEPTED.	DETAIL G SHEET L1.52
SA-3	CASUAL CHAIR	MMCITE 267-300-6995	LIMPIDO LLP235	TBD	-	TO BE BOLTED PER MANUF. RECOMMENDATIONS. CONTRACTOR TO SUBMIT SHOP DRAWING	-
SA-4	CHALKBOARD AT OUTDOOR CLASSROOM	PLATINUM VISUAL SYSTEMS ELISIA GUIDO: 951.817.2222	4'X8' WRITANIUM CHALKBOARD	BLACK	-	DROP-IN-TRAY SYSTEM, ALUMIN. FRAME CORE MTRL TO BE CEMENTITIOUS NOT PARTICLE BOARD	DETAIL O SHEET L1.52
SA-5	PRECAST TABLE AND BENCHES	QCP 866-703-3434	GROOVE - Q-GROOVE-72T	NATURAL	POLISHED	-	DETAIL A & D SHEET L1.54
SA-6	PRECAST TABLE AND CHAIRS	QCP 866-703-3434	BOX - Q-BOX-32T	NATURAL	POLISHED	-	DETAIL B & E SHEET L1.54
SA-7	NOT USED	-	-	-	-	-	-
SA-8	TREE GRATE	URBAN ACCESSORIES, DISTRIB. BY SPRUCE & GANDER 760-690-4083	CASCADE 4X8 GREY IRON (STANDARD)		RAW (STANDARD)	FRAME ON 3 SIDES ABUTTING CONCRETE, NO FRAME ON SIDE ABUTTING PA. CENTER OPENING TO BE CUT TO 20" WIDTH PRIOR TO INSTALLATION.	DETAIL H SHEET L1.53
SA-9	HANDRAIL	-	STAINLESS STEEL	BRUSHED	-	-	DETAIL P SHEET L1.51
SA-10	NOT USED	-	-	-	-	-	-
SA-11	SLOPED TURF	-	-	-	-	-	-
SA-12	BIKE RACK	FORMS AND SURFACES 800-451-0410	OLYMPIA	ALUMINUM TEXTURE	-	INSTALL PER MANUFACTURER'S SPECIFICATIONS	DETAIL B SHEET L1.53
SA-13	BENCH (NO BACK)	MMCITE 267-300-6995	LIMPIDO LLP226	TBD FROM MFR STANDARD COLOR SELECTIONS	-	TO BE BOLTED PER MANUF. RECOMMENDATIONS. CONTRACTOR TO SUBMIT SHOP DRAWING	DETAIL C SHEET L1.54
SA-14	BENCH (WITH BACK)	MMCITE 267-300-6995	LIMPIDO LLP256	TBD FROM MFR STANDARD COLOR SELECTIONS	-	TO BE BOLTED PER MANUF. RECOMMENDATIONS. CONTRACTOR TO SUBMIT SHOP DRAWING	DETAIL F SHEET L1.54
SA-15	WHEELCHAIR SPACE AND ACCESSIBLE SURFACE AT OUTDOOR TABLE	QCP 866-703-3434	GROOVE - Q-GROOVE-72T BOX - Q-BOX-32T	NATURAL	-		DETAILS D & E, SHEET L1.54
SA-16	WHEELCHAIR SPACE AND COMPANION SEATING	-	-	-	-	-	DETAIL M SHEET L1.51

REFERENCE LEGEND

1	EXISTING FENCE, PROTECT IN PLACE
2	EXISTING DOUBLE SWING FIRE ACCESS GATE, PROTECT IN PLACE
3	EXISTING FIRE LANE, PROTECT IN PLACE
4	EXISTING PROMENADE/FIRE LANE, PROTECT IN PLACE
5	EXISTING PLANTING AREA, PROTECT IN PLACE
6	PARKING LOT, PROTECT IN PLACE
7	EXISTING CONCRETE PATH
8	EXISTING SIDEWALK, PROTECT IN PLACE
9	EXISTING TREE, PROTECT IN PLACE
10	BUILDING OVERHANG
11	RAISED PLANTER - SEE A10.14 & A10.17
12	CONCRETE PAD FOR TRANSFORMER - SEE S8.60
13	RAIN GARDENS PER CIVIL
14	GRAVEL BANDS - SEE PLANTING SHEETS
15	GRAVEL MAINTENANCE STRIP - SEE PLANTING SHEETS
16	GRAVEL FOR INTERIOR PLANTERS - SEE PLANTING LEGEND AND ARCHITECTURE DETAILS
17	STEEL HEADER - SURE-LOC 1" THICK, UNPAINTED
18	BOULDERS - SEE PLANTING SHEETS FOR COLOR, QTY, SIZE
19	GRAVEL FIRE LANE EXTENSION - PER CIVIL
20	EMERGENCY BLUEPHONE
21	SITE LIGHTING FIXTURE - SEE E0.03 & E1.22
22	GRAVEL MULCH - SEE PLANTING LEGEND

ABBREVIATION AND SYMBOL LEGEND

CL	CENTER LINE
PA	PLANTING AREA
TYP.	TYPICAL
F.O.B.	FACE OF BUILDING
—●—	STEP

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT

EPTDESIGN
844 EAST GREEN STREET, SUITE 201
PASADENA, CA 91101
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FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

MASTER CONSTRUCTION SCHEDULE AND NOTES

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

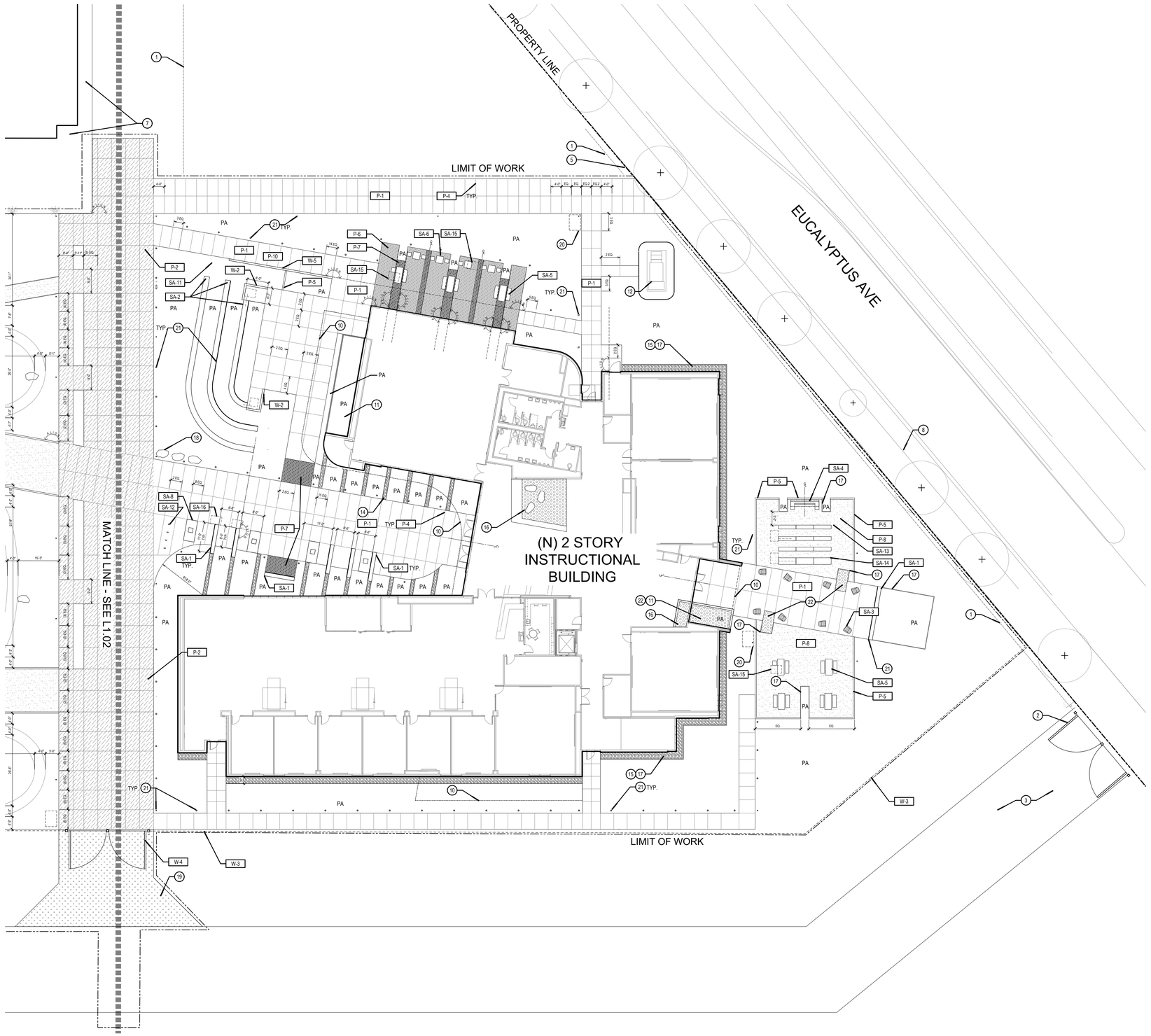
L1.00

2/13/2020 3:47:43 PM

MASTER CONSTRUCTION SCHEDULE AND NOTES

PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH (ONE .4" TRIM) WHEN PRINTED ON 24" BY 36"



PAVING LEGEND

FOR MATERIALS, COLORS, FINISHES AND MODELS, SEE MASTER CONSTRUCTION LEGEND, SHEET L1.00

ITEM	DESCRIPTION	DETAIL
P-1	CONCRETE PAVING (PEDESTRIAN)	DETAIL A SHEET L1.51
P-2	CONCRETE PAVING (VEHICULAR)	DETAIL E SHEET L1.51
P-3	CONCRETE BAND AT QUAD EDGE	DETAIL J SHEET L1.51
P-4	CONCRETE SAWCUT JOINT	DETAIL D SHEET L1.51
P-5	CONCRETE MOW CURB	DETAIL H SHEET L1.51
P-6	UNIT PAVERS	DETAIL G SHEET L1.51
P-7	UNIT PAVERS	DETAIL G SHEET L1.51
P-8	DECOMPOSED GRANITE (STABILIZED)	DETAIL I SHEET L1.51
P-9	CONCRETE STAIRS - QUAD	DETAIL F SHEET L1.51
P-10	SLOPED CONCRETE WALKWAY	DETAIL A SHEET L1.51
P-11	JOINT AT NEW & EXISTING CONCRETE	DETAIL N SHEET L1.51

WALL & FENCE LEGEND

W-1	SEAT WALL AT QUAD STEPS	DETAIL P SHEET L1.51
W-2	RETAINING WALL AT WHEELCHAIR SPACE AT AMPHITHEATER	DETAILS F/L1.52 & G/L1.53
W-3	CHAINLINK FENCE	DETAIL L SHEET L1.52
W-4	CHAINLINK GATE FOR EMERGENCY ACCESS	DETAIL D SHEET L1.52
W-5	RETAINING WALL AT SLOPED WALK	DETAIL P SHEET L1.52

SITE AMENITIES LEGEND

SA-1	CONCRETE BENCHES - ENTRY COURTYARD	DETAILS E & G SHEET L1.53
SA-2	CONCRETE BENCHES - AMPHITHEATER	DETAIL G SHEET L1.52
SA-3	CASUAL CHAIR	-
SA-4	CHALKBOARD AT OUTDOOR CLASSROOM	DETAIL O SHEET L1.52
SA-5	PRECAST TABLE AND BENCHES	DETAIL A & D SHEET L1.54
SA-6	PRECAST TABLE AND CHAIRS	DETAIL B & E SHEET L1.54
SA-7	NOT USED	-
SA-8	TREE GRATE	DETAIL H SHEET L1.53
SA-9	HANDRAIL	DETAIL P SHEET L1.51
SA-10	NOT USED	-
SA-11	SLOPED TURF	-
SA-12	BIKE RACK	DETAIL B SHEET L1.53
SA-13	BENCH (NO BACK)	DETAIL C SHEET L1.54
SA-14	BENCH (WITH BACK)	DETAIL F SHEET L1.54
SA-15	WHEELCHAIR SPACE ACCESSIBLE SURFACE AT OUTDOOR TABLE	DETAILS D & E, SHEET L1.54
SA-16	WHEELCHAIR SPACE AND COMPANION SEATING	DETAIL M SHEET L1.51

REFERENCE LEGEND

1	EXISTING FENCE, PROTECT IN PLACE
2	EXISTING DOUBLE SWING FIRE ACCESS GATE, PROTECT IN PLACE
3	EXISTING FIRE LANE, PROTECT IN PLACE
4	EXISTING PROMENADE/FIRE LANE, PROTECT IN PLACE
5	EXISTING PLANTING AREA, PROTECT IN PLACE
6	PARKING LOT, PROTECT IN PLACE
7	EXISTING CONCRETE PATH
8	EXISTING SIDEWALK, PROTECT IN PLACE
9	EXISTING TREE, PROTECT IN PLACE
10	BUILDING OVERHANG
11	RAISED PLANTER - SEE A10.14 & A10.17
12	CONCRETE PAD FOR TRANSFORMER - SEE S8.60
13	RAIN GARDENS PER CIVIL
14	GRAVEL BANDS - SEE PLANTING SHEETS
15	GRAVEL MAINTENANCE STRIP - SEE PLANTING SHEETS
16	GRAVEL FOR INTERIOR PLANTERS - SEE PLANTING LEGEND AND ARCHITECTURE DETAILS
17	STEEL HEADER (SURE-LOC ¼" THICK, UNPAINTED) Δ
18	BOULDERS - SEE PLANTING SHEETS FOR COLOR, QTY, SIZE
19	GRAVEL FIRE LANE EXTENSION - PER CIVIL
20	EMERGENCY BLUEPHONE
21	SITE LIGHTING FIXTURE - SEE E0.03 & E1.22
22	GRAVEL MULCH - SEE PLANTING LEGEND

ABBREVIATION AND SYMBOL LEGEND

CL	CENTER LINE
PA	PLANTING AREA
TYP.	TYPICAL
F.O.B.	FACE OF BUILDING
	STEP

REFER TO SHEET L1.00 FOR MASTER CONSTRUCTION SCHEDULES AND NOTES

0 4 8 16 32 Feet

Scale: 1/16" = 1'-0"

CONSTRUCTION PLAN ENLARGEMENT

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

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2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT

EPTDESIGN
844 EAST GREEN STREET, SUITE 201
PASADENA, CA 91101
626.795.2008
EPTDESIGN.COM

FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

CONSTRUCTION PLAN ENLARGEMENT

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

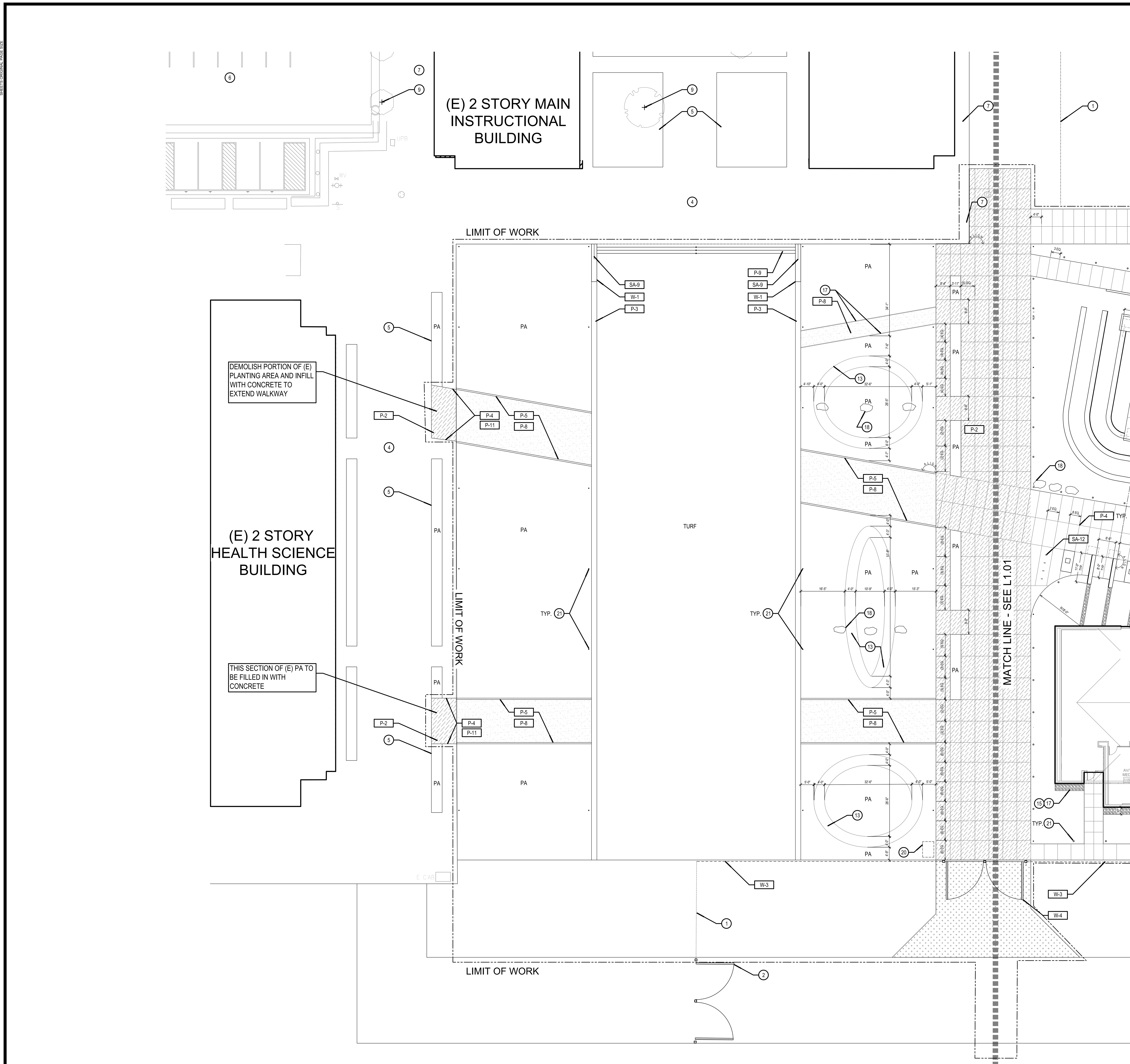
DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

L1.01

2/13/2020 3:47:43 PM

PLEASE RECYCLE



PAVING LEGEND

FOR MATERIALS, COLORS, FINISHES AND MODELS, SEE MASTER CONSTRUCTION LEGEND, SHEET L1.00

ITEM	DESCRIPTION	DETAIL
P-1	CONCRETE PAVING (PEDESTRIAN)	DETAIL A SHEET L1.51
P-2	CONCRETE PAVING (VEHICULAR)	DETAIL E SHEET L1.51
P-3	CONCRETE BAND AT QUAD EDGE	DETAIL J SHEET L1.51
P-4	CONCRETE SAWCUT JOINT	DETAIL D SHEET L1.51
P-5	CONCRETE MOW CURB	DETAIL H SHEET L1.51
P-6	UNIT PAVERS	DETAIL G SHEET L1.51
P-7	UNIT PAVERS	DETAIL G SHEET L1.51
P-8	DECOMPOSED GRANITE (STABILIZED)	DETAIL I SHEET L1.51
P-9	CONCRETE STAIRS - QUAD	DETAIL F SHEET L1.51
P-10	SLOPED CONCRETE WALKWAY	DETAIL A SHEET L1.51
P-11	JOINT AT NEW & EXISTING CONCRETE	DETAIL N SHEET L1.51

WALL & FENCE LEGEND

W-1	SEAT WALL AT QUAD STEPS	DETAIL P SHEET L1.51
W-2	RETAINING WALL AT WHEELCHAIR SPACE AT AMPHITHEATER	DETAILS F/L1.52 & G/L1.53
W-3	CHAINLINK FENCE	DETAIL L SHEET L1.52
W-4	CHAINLINK GATE FOR EMERGENCY ACCESS	DETAIL D SHEET L1.52
W-5	RETAINING WALL AT SLOPED WALK	DETAIL P SHEET L1.52

SITE AMENITIES LEGEND

SA-1	CONCRETE BENCHES - ENTRY COURTYARD	DETAILS E & G SHEET L1.53
SA-2	CONCRETE BENCHES - AMPHITHEATER	DETAIL G SHEET L1.52
SA-3	CASUAL CHAIR	-
SA-4	CHALKBOARD AT OUTDOOR CLASSROOM	DETAIL O SHEET L1.52
SA-5	PRECAST TABLE AND BENCHES	DETAIL A & D SHEET L1.54
SA-6	PRECAST TABLE AND CHAIRS	DETAIL B & E SHEET L1.54
SA-7	NOT USED	-
SA-8	TREE GRATE	DETAIL H SHEET L1.53
SA-9	HANDRAIL	DETAIL P SHEET L1.51
SA-10	NOT USED	-
SA-11	SLOPED TURF	-
SA-12	BIKE RACK	DETAIL B SHEET L1.53
SA-13	BENCH (NO BACK)	DETAIL C SHEET L1.54
SA-14	BENCH (WITH BACK)	DETAIL F SHEET L1.54
SA-15	WHEELCHAIR SPACE ACCESSIBLE SURFACE AT OUTDOOR TABLE	DETAILS D & E, SHEET L1.54
SA-16	WHEELCHAIR SPACE AND COMPANION SEATING	DETAIL M SHEET L1.51

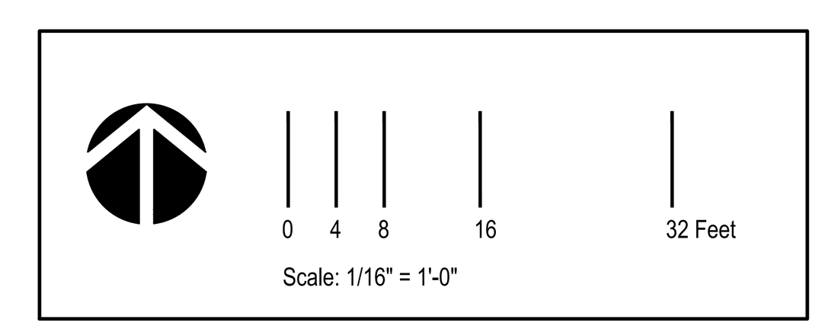
REFERENCE LEGEND

1	EXISTING FENCE, PROTECT IN PLACE
2	EXISTING DOUBLE SWING FIRE ACCESS GATE, PROTECT IN PLACE
3	EXISTING FIRE LANE, PROTECT IN PLACE
4	EXISTING PROMENADE/FIRE LANE, PROTECT IN PLACE
5	EXISTING PLANTING AREA, PROTECT IN PLACE
6	PARKING LOT, PROTECT IN PLACE
7	EXISTING CONCRETE PATH
8	EXISTING SIDEWALK, PROTECT IN PLACE
9	EXISTING TREE, PROTECT IN PLACE
10	BUILDING OVERHANG
11	RAISED PLANTER - SEE A10.14 & A10.17
12	CONCRETE PAD FOR TRANSFORMER - SEE S8.60
13	RAIN GARDENS PER CIVIL
14	GRAVEL BANDS - SEE PLANTING SHEETS
15	GRAVEL MAINTENANCE STRIP - SEE PLANTING SHEETS
16	GRAVEL FOR INTERIOR PLANTERS - SEE PLANTING LEGEND AND ARCHITECTURE DETAILS
17	STEEL HEADER SURE-LOC 1/4" THICK, UNPAINTED △2
18	BOULDERS - SEE PLANTING SHEETS FOR COLOR, QTY, SIZE
19	GRAVEL FIRE LANE EXTENSION - PER CIVIL
20	EMERGENCY BLUEPHONE
21	SITE LIGHTING FIXTURE - SEE E0.03 & E1.22
22	GRAVEL MULCH - SEE PLANTING LEGEND

ABBREVIATION AND SYMBOL LEGEND

CL	CENTER LINE
PA	PLANTING AREA
TYP.	TYPICAL
F.O.B.	FACE OF BUILDING
—●—	STEP

REFER TO SHEET L1.00 FOR MASTER CONSTRUCTION SCHEDULES AND NOTES



AGENCY APPROVAL:

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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

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L1.02

CONSTRUCTION PLAN ENLARGEMENT

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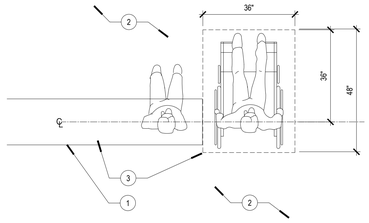
PLEASE RECYCLE

THE LINE BROKEN ABOVE IS EXACTLY 36" WHEN PLOTTED AT FULL SIZE
IF NOT, THIS DRAWING IS NOT TO SCALE

1. CONCRETE BENCH PER DETAIL E/L1.53
2. ADJACENT CONCRETE PAVING PER PLAN
3. WHEELCHAIR SPACE AND COMPANION SEAT PER ADA. SHOULDER ALIGNMENT

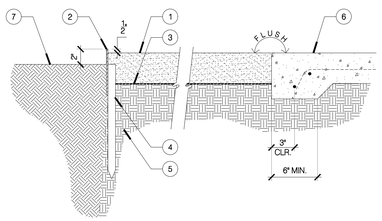


M Wheelchair Space and Companion Seating

Scale: 1/2" = 1'-0"

1. 3" THICK LAYER OF STABILIZED DECOMPOSED GRANITE PAVING, INSTALL IN LIFTS
2. STEEL EDGING PER PLAN. SEE REFERENCE LEGEND/L1.00 FOR MORE INFORMATION
3. MIRAFI FILTER FABRIC
4. STEEL STAKES PER EDGING MANUFACTURER
5. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
6. ADJACENT CONCRETE PAVING
7. ADJACENT PLANTING AREA

NOTES:
A. REFER TO MASTER CONSTRUCTION LEGEND FOR ADDITIONAL INFORMATION.
B. DECOMPOSED GRANITE PAVING AROUND TREES SHOULD BE UNSTABILIZED WITHIN 24" OF THE TREE TRUNK TO ALLOW WATER PERCOLATION AND AIR TO ROOTS

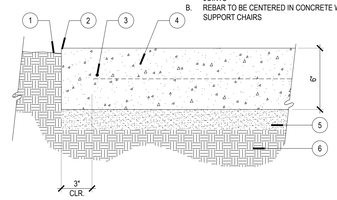


I Decomposed Granite

Scale: 1-1/2"=1'-0"

1. FINISH GRADE:
   -½" BELOW F.S. FOR LANDSCAPE AREAS
2. ¾" RADIUS AT EDGE OF PAVING.
3. REBAR SIZE AND SPACING PER CIVIL DRAWINGS. SEE DETAIL 2/C9.00
4. CONCRETE PAVING - SEE CONSTRUCTION LEGEND FOR COLOR AND FINISH
5. SUBBASE PER CIVIL DRAWINGS AND GEOTECHNICAL REPORT
6. SUBGRADE COMPACTED PER CIVIL DRAWINGS AND GEOTECHNICAL REPORT

NOTES:
A. SEE CONSTRUCTION PLAN FOR LOCATION OF JOINTS
B. REBAR TO BE CENTERED IN CONCRETE WITH SUPPORT CHAIRS

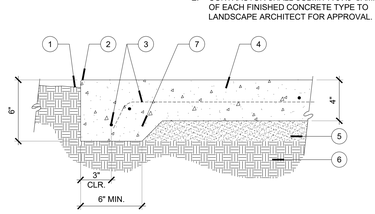


E Concrete Paving - Vehicular

Scale: 2"=1'-0"

1. FINISH GRADE:
   -½" BELOW F.S. FOR PLANTING AREAS
2. ¾" RADIUS
3. REBAR SIZE AND SPACING PER GEOTECHNICAL REPORT RECOMMENDATIONS FOR PAVEMENT
4. CONCRETE PAVING. SEE CONSTRUCTION LEGEND FOR COLOR AND FINISH
5. SUBBASE PER GEOTECHNICAL REPORT
6. SUBGRADE COMPACTED PER GEOTECHNICAL REPORT
7. THICKENED EDGE

NOTES:
A. SEE CONSTRUCTION PLAN FOR SCORE JOINT LOCATIONS
B. CONTRACTOR TO PROVIDE SHOP DRAWING DETAILING CONSTRUCTION JOINT LAYOUT PLAN TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO POURING CONCRETE HARDSCAPE.
C. INSTALL EXPANSION JOINTS BETWEEN NEW CONCRETE PAVING AND VERTICAL SURFACES, INCLUDING CONCRETE SEATWALLS, BUILDINGS, ETC. SEE DETAIL C, THIS SHEET.
D. REBAR TO BE CENTERED IN CONCRETE WITH SUPPORT CHAIRS
E. CONTRACTOR SHALL SUBMIT A 5'X5' SAMPLE OF EACH FINISHED CONCRETE TYPE TO LANDSCAPE ARCHITECT FOR APPROVAL.

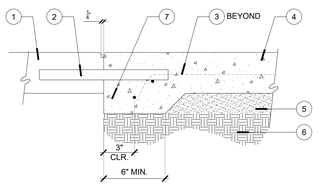


A Concrete Paving - Pedestrian

Scale: 2"=1'-0"

1. EXISTING CONCRETE
2. DRILL INTO EXISTING SLAB TO EMBED 18" DOWEL (9" EMBED) @ 12" O.C.
3. REBAR SIZE AND SPACING PER GEOTECHNICAL REPORT RECOMMENDATIONS FOR PAVEMENT
4. VEHICULAR CONCRETE PAVING, SEE DETAIL 2/C9.00. SEE CONSTRUCTION LEGEND FOR COLOR AND FINISH
5. SUBBASE PER GEOTECHNICAL REPORT
6. SUBGRADE COMPACTED PER GEOTECHNICAL REPORT
7. THICKENED EDGE

NOTES:
A. SEE CONSTRUCTION PLAN FOR CONSTRUCTION AND SCORE JOINT LOCATIONS
B. CONTRACTOR TO PROVIDE SHOP DRAWING DETAILING CONSTRUCTION JOINT AND SCORE JOINT LAYOUT PLAN TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO POURING CONCRETE HARDSCAPE. SEE DETAILS B AND C, THIS SHEET.
C. INSTALL EXPANSION JOINTS BETWEEN NEW CONCRETE PAVING AND VERTICAL SURFACES, INCLUDING CONCRETE SEATWALLS, BUILDINGS, ETC. SEE DETAIL D, THIS SHEET.
D. REBAR TO BE CENTERED IN CONCRETE WITH SUPPORT CHAIRS

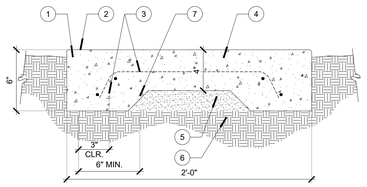


N Construction Joint at Existing Concrete

Scale: 2"=1'-0"

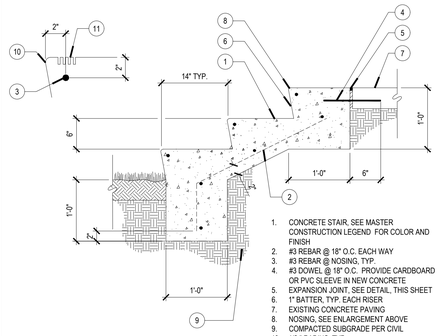
1. FINISH GRADE:
   -½" BELOW F.S. FOR PLANTING AREAS
2. ⅜" RADIUS
3. REBAR SIZE AND SPACING PER CIVIL
4. CONCRETE PAVING. SEE CONSTRUCTION LEGEND FOR COLOR AND FINISH
5. SUBBASE PER GEOTECHNICAL REPORT
6. SUBGRADE COMPACTED PER GEOTECHNICAL REPORT
7. THICKENED EDGE

NOTES:
A. SEE CONSTRUCTION PLAN FOR SCORE JOINT LOCATIONS
B. CONTRACTOR TO PROVIDE SHOP DRAWING DETAILING CONSTRUCTION JOINT LAYOUT PLAN TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO POURING CONCRETE HARDSCAPE.
C. INSTALL EXPANSION JOINTS BETWEEN NEW CONCRETE PAVING AND VERTICAL SURFACES, INCLUDING CONCRETE SEATWALLS, BUILDINGS, ETC. SEE DETAIL C, THIS SHEET.
D. REBAR TO BE CENTERED IN CONCRETE WITH SUPPORT CHAIRS
E. CONTRACTOR SHALL SUBMIT A 5'X5' SAMPLE OF EACH FINISHED CONCRETE TYPE TO LANDSCAPE ARCHITECT FOR APPROVAL.



J Concrete Band @ Quad Edge

Scale: 2"=1'-0"



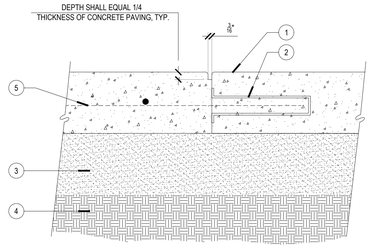
1. CONCRETE STAIR, SEE MASTER CONSTRUCTION LEGEND FOR COLOR AND FINISH
2. #3 REBAR @ 18" O.C. EACH WAY
3. #3 REBAR @ NOSING, TYP.
4. #3 DOWEL @ 18" O.C. PROVIDE CARDBOARD OR PVC SLEEVE IN NEW CONCRETE
5. EXPANSION JOINT, SEE DETAIL, THIS SHEET
6. 1" BATTER, TYP. EACH RISER
7. EXISTING CONCRETE PAVING
8. NOSING, SEE ENLARGEMENT ABOVE
9. COMPACTED SUBGRADE PER CIVIL
10. 1/2 " RADIUS, TYP.
11. FOUR 1/8" WIDE x 1/4" DEEP SCORE LINES, APPLY CONTRASTING COLOR ON ALL STEPS AND UPPER APPROACH

NOTES:
A. INSTALL HANDRAILS PER PLAN. SEE DETAIL P THIS SHEET.

F Concrete Stairs - Quad

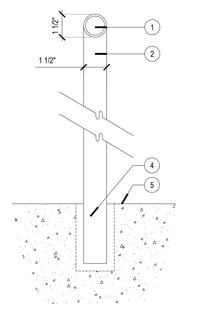
Scale: 1"=1'-0"

1. CONCRETE PAVING, PER PLAN
2. SPEED DOWELS, 18" LONG (9" EMBED) @ 12" O.C.
3. SUBBASE PER GEOTECHNICAL REPORT
4. SUBGRADE COMPACTED PER GEOTECHNICAL REPORT
5. REBAR SIZE AND SPACING PER CIVIL

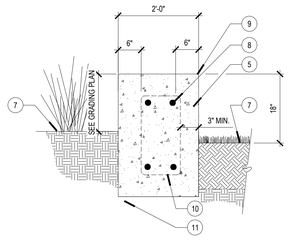


B Construction Joint

Scale: 3"=1'-0"



Section through handrail and post
NTS



Section through seat wall

1. 1-1/2" DIAMETER TUBULAR STEEL HANDRAIL.
2. 1-1/2" DIAMETER TUBULAR STEEL POSTS, GRIND SMOOTH AT RAIL.
3. STAIRS PER PLAN AND PER DETAIL F, THIS SHEET
4. CORE DRILL 4" DIAMETER HOLE (IN EXISTING CONCRETE AT NORTH AND IN SEAT WALL AT SOUTH) AND SET HANDRAIL POST WITH POR-ROK
5. POURED IN PLACE CONCRETE SEAT WALL. COLOR & FINISH PER MASTER CONSTRUCTION LEGEND. PITCH TOP TO DRAIN.
6. EXPANSION JOINT, ±5' O.C., TYPICAL. SPREAD EQUALLY ACROSS LENGTH OF WALL.
7. ADJACENT PLANTING AREA PER PLAN
8. NO. 4 REBAR, CONTINUOUS
9. 1/2" RADIUS, TYPICAL
10. NO. 4 REBAR AT 12" O.C. WITH ALTERNATE BENDS IN FOOTING
11. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT

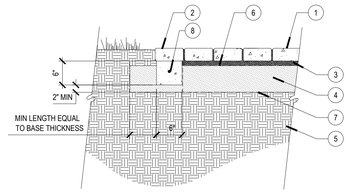
NOTES
A. STEEL FINISH TO BE BRUSHED

P Seat Wall and Handrail at Quad Steps

Scale: 3/4" = 1'-0"

1. CONCRETE PAVERS, 60MM MINIMUM THICKNESS
2. CAST IN PLACE CONCRETE CURB WITH POLYMER OR MORTAR ADHERED PAVER ON TOP. PROVIDE MIN 1" OVERHANG ON EACH SIDE
3. 1" BEDDING LAYER, CONFORMS TO ASTM C33 WITH <1% PASSING 0.080 MM
4. MINIMUM 4" AGGREGATE BASE LAYERED AND COMPACTED PER GEOTECHNICAL REPORT
5. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
6. GEOTEXTILE. 12" WIDE AT ALL PERIMETERS, TURN UP AGAINST CURB
7. OPTIONAL GEOTEXTILE SEPARATION FABRIC ON ENTIRE BOTTOM OF AGGREGATE BASE (EXTENDS BEYOND CURB)
8. #4 REBAR, CENTERED IN CURB

NOTES:
A. CONTRACTOR SHALL INSTALL PAVERS PER MANUFACTURE'S SPECIFICATIONS.

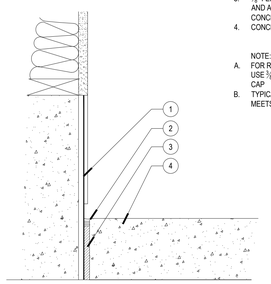


G Unit Pavers

Scale: 1" = 1'-0"

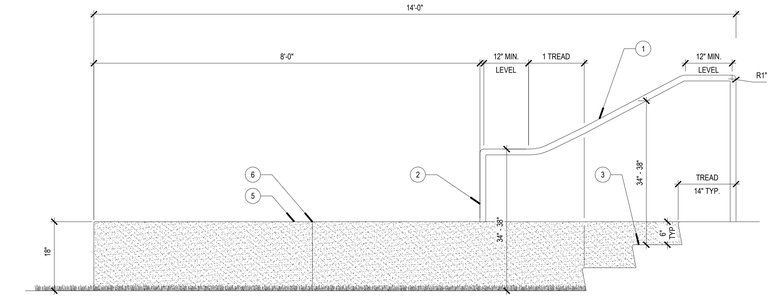
1. ADJACENT BUILDING, STEPS OR WALL
2. ½" TOOLED RADIUS - TYP.
3. ½" FELT EXPANSION JOINT WITH JOINT CAP AND APPROVED MASTIC SEALANT TO MATCH CONCRETE COLOR TYP.
4. CONCRETE PAVING PER PLAN

NOTE:
A. FOR RADIUS OR IRREGULAR JOINT LAYOUT - USE ¾" THICK FOAM JOINT WITH TEAR AWAY CAP
B. TYPICAL DETAIL WHERE CONCRETE PAVING MEETS VERTICAL SURFACES



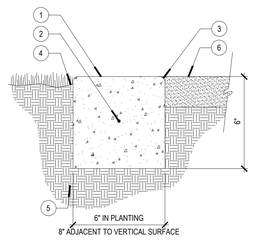
C Vertical Expansion Joint

Scale: 3"=1'-0"



1. CONCRETE MOWCURB, SEE CONSTRUCTION LEGEND FOR COLOR AND FINISH
2. REBAR PER CIVIL
3. ¾" RADIUS, TYP.
4. FINISH GRADE:
   -½" BELOW F.S. FOR TURF AREAS
   -1½" BELOW F.S. FOR SHRUB AREAS
5. COMPACTED SUBGRADE PER CIVIL
6. DECOMPOSED GRANITE, PER MASTER CONSTRUCTION LEGEND

NOTES:
A. PROVIDE A 1" DEEP SCORE JOINT AT 10' O.C. AND AT ALL CHANGES IN DIRECTION.
B. REBAR TO BE CENTERED IN CONCRETE WITH MIN. 18" TIED END OVERLAPS.



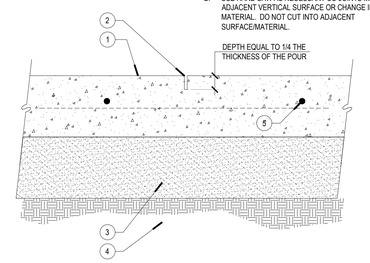
H Concrete Mowcurb

Scale: 3"=1'-0"

1. CONCRETE PAVING PER PLAN
2. ¾" SAWCUT JOINT
3. SUBBASE PER GEOTECHNICAL REPORT
4. SUBGRADE COMPACTED PER GEOTECHNICAL REPORT
5. REBAR SIZING AND SPACING PER CIVIL DRAWINGS

NOTES:
A. SEE CONSTRUCTION PLAN FOR LOCATION OF SAWCUT JOINTS.
B. USE HAND SAW AS NECESSARY SO JOINTS MEET ADJACENT VERTICAL SURFACE OR CHANGE IN MATERIAL. DO NOT CUT INTO ADJACENT SURFACE/MATERIAL.

DEPTH EQUAL TO 1/4 THE THICKNESS OF THE POUR



D Sawcut Joint

Scale: 3" = 1'-0"

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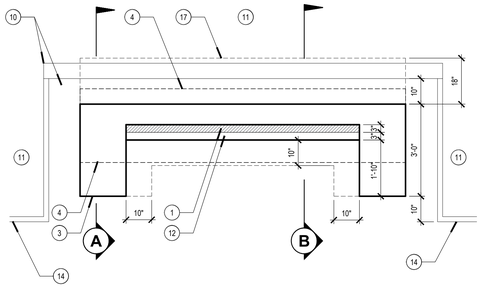
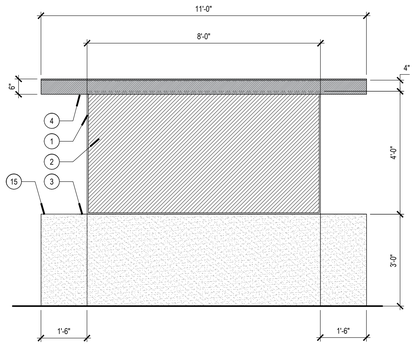


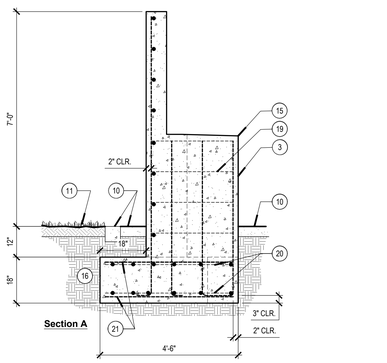
Plan



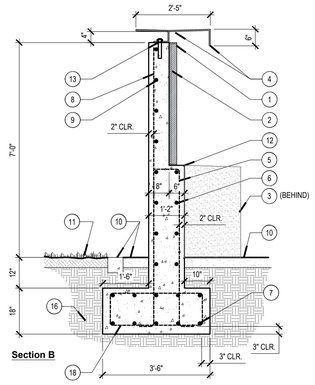
Elevation

1. 3" x ½" THICK STAINLESS STEEL CHALKBOARD FRAME
2. 4' X 8' WRITANIUM MAGNETIC CHALKBOARD ADHERED TO CONCRETE SURFACE AS RECOMMENDED BY MANUFACTURER FOR PROJECT CONDITIONS - PORCELAIN ENAMEL FINISH FUSED TO 28 GAUGE STAINLESS STEEL SHEET, CEMENT CORE, ALUMINUM BACKING
3. POURED IN PLACE CONCRETE WALL WITH SMOOTH FINISH
4. ½" THICK STAINLESS STEEL RAIN GUARD, SLOPED TO BACK TO DRAIN
5. #5 REBAR @ 12" O.C., VERTICAL
6. #5 REBAR @ 12" O.C., HORIZONTAL
7. (5) #4 MIN REBAR TOP AND BOTTOM, EVENLY DISTRIBUTED ALONG FOOTING
8. #6 REBAR @ 12" O.C., VERTICAL
9. #6 REBAR @ 12" O.C., HORIZONTAL
10. ADJACENT PAVING PER PLAN
11. PLANTING AREA PER PLAN
12. CONCRETE LEDGE
13. BOLT L-BRACKET WITH ¾" DIA. KWIK BOLT TZ (OR EQUAL) ANCHORS @ 16" O.C., EMBED 5-1/2" MIN., THEN WELD WEATHERGUARD TOP TO L-BRACKET
14. STEEL HEADER PER PLAN
15. ½" RADIUS AT ALL CORNERS, TYPICAL
16. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
17. FOOTING
18. #5 REBAR @ 12" O.C. TOP & BOTTOM
19. #5 REBAR HORIZONTAL @ 12" E.F.
20. (6) #4 MIN REBAR TOP AND BOTTOM - INCLUDING CONTINUOUS REBAR FROM BEYOND
21. (2) #5 FOOTING REINFORCEMENT, TOP AND BOTTOM

NOTES:
A. TOPS OF WALLS AND LEDGE TO SLOPE TO DRAIN.
B. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL BY LANDSCAPE ARCHITECT PRIOR TO CONSTRUCTION.
C. CONTRACTOR TO INSTALL CHALKBOARD PER THE DIMENSIONS INDICATED IN THE DETAIL. ALTHOUGH MANUFACTURER PROVIDES COMPLETE CHALKBOARD SYSTEMS, CONTRACTOR WILL ONLY NEED TO PURCHASE CHALKBOARD SURFACE. INSTALL CHALKBOARD SURFACE PER MANUFACTURER SPECIFICATIONS.
D. CONCRETE TO BE 3000 PSI MINIMUM.
E. SEE MASTER CONSTRUCTION LEGEND FOR MORE INFORMATION.
F. REFER TO DSA BACK CHECK STRUCTURAL CALCULATIONS



Section A



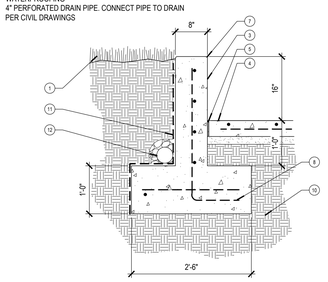
Section B

O Chalkboard Wall

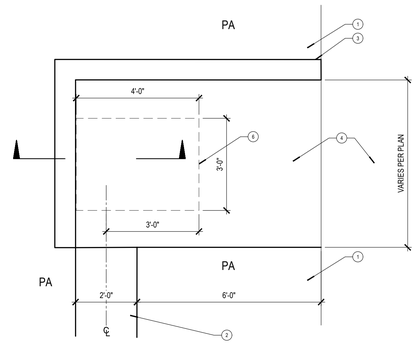
Scale: 1/2" = 1'-0"

1. TURF PER PLANTING PLAN
2. CAST IN PLACE CONCRETE AMPHITHEATER SEAT WALL, SEE DETAIL G THIS SHEET
3. CAST IN PLACE CONCRETE RETAINING WALL
4. PAVING PER PLAN
5. VERTICAL EXPANSION JOINT SEE DETAIL C, SHEET L1.51
6. WHEELCHAIR SPACE WITH SHOULDER ALIGNMENT TO COMPANION SEATING
7. 1/2" RADIUS AT ALL CORNERS, TYP.
8. #4 REBAR AT 12" O.C.E.W.
9. CONCRETE BENCHES, SEE DETAIL G, THIS SHEET
10. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
11. WATERPROOFING
12. 4" PERFORATED DRAIN PIPE. CONNECT PIPE TO DRAIN PER CIVIL DRAWINGS

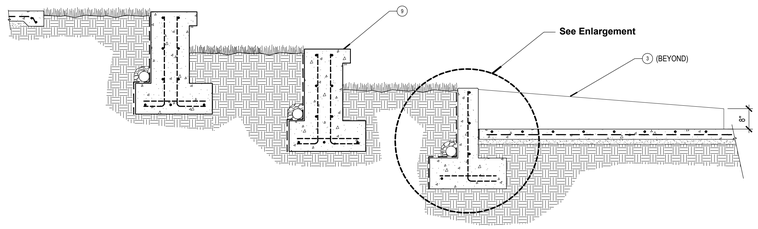
NOTES
A. SEE MASTER CONSTRUCTION LEGEND FOR COLORS AND FINISHES
B. SEE GRADING PLAN FOR GRADES AND TOP OF WALLS
C. SKATE DETERRENTS TO BE INSTALLED, SEE DETAIL L, SHEET L1.51 (Δ)



Enlargement View - Section Only
Scale: 3/4" = 1'-0"

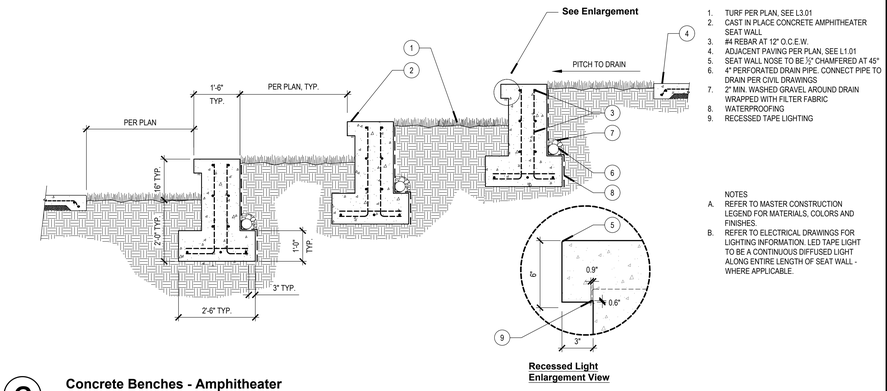


Plan View
Scale: 1/2" = 1'-0"



F Retaining Wall at Wheelchair Space at Amphitheater

Scale: 1/2" = 1'-0"



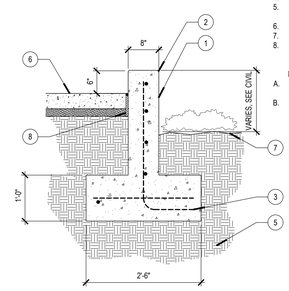
Recessed Light Enlargement View

1. TURF PER PLAN, SEE L3.01
2. CAST IN PLACE CONCRETE AMPHITHEATER SEAT WALL
3. #4 REBAR AT 12" O.C.E.W.
4. ADJACENT PAVING PER PLAN, SEE L1.01
5. SEAT WALL NOSE TO BE ½" CHAMFERED AT 45°
6. 4" PERFORATED DRAIN PIPE. CONNECT PIPE TO DRAIN PER CIVIL DRAWINGS
7. 2" MIN. WASHED GRAVEL AROUND DRAIN WRAPPED WITH FILTER FABRIC
8. WATERPROOFING
9. RECESSED TAPE LIGHTING

NOTES
A. REFER TO MASTER CONSTRUCTION LEGEND FOR MATERIALS, COLORS AND FINISHES.
B. REFER TO ELECTRICAL DRAWINGS FOR LIGHTING INFORMATION. LED TAPE LIGHT TO BE A CONTINUOUS DIFFUSED LIGHT ALONG ENTIRE LENGTH OF SEAT WALL - WHERE APPLICABLE.

G Concrete Benches - Amphitheater

Scale: 1/2"=1'-0"

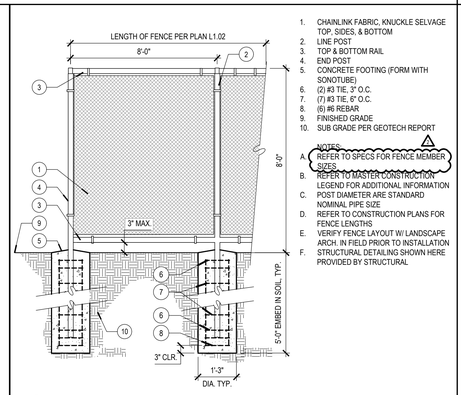


P Retaining Wall at Sloped Walk

Scale: 3/4"=1'-0"

1. POURED IN PLACE CONCRETE WALL
2. ½" RADIUS ALL CORNERS, TYP.
3. #4 REBAR AT 12" O.C.E.W.
4. NOT USED
5. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
6. ADJACENT PAVING PER PLAN
7. ADJACENT PLANTING AREA PER PLAN
8. VERTICAL EXPANSION JOINT, SEE DETAIL C/L1.51

NOTES:
A. SEE MASTER CONSTRUCTION LEGEND FOR COLOR AND FINISH
B. SEE GRADING PLAN FOR GRADES AND TOP OF WALLS



1. CHAINLINK FABRIC, KNUCKLE SELVAGE TOP, SIDES, & BOTTOM
2. LINE POST
3. TOP & BOTTOM RAIL
4. END POST
5. CONCRETE FOOTING (FORM WITH SONOTUBE)
6. (2) #3 TIE, 3" O.C.
7. (7) #3 TIE, 6" O.C.
8. (6) #6 REBAR
9. FINISHED GRADE
10. SUB GRADE PER GEOTECH REPORT

NOTES:
A. REFER TO SPECS FOR FENCE MEMBER SIZES
B. REFER TO MASTER CONSTRUCTION LEGEND FOR ADDITIONAL INFORMATION
C. POST DIAMETER ARE STANDARD NOMINAL PIPE SIZE
D. REFER TO CONSTRUCTION PLANS FOR FENCE LENGTHS
E. VERIFY FENCE LAYOUT W/ LANDSCAPE ARCH. IN FIELD PRIOR TO INSTALLATION
F. STRUCTURAL DETAILING SHOWN HERE PROVIDED BY STRUCTURAL

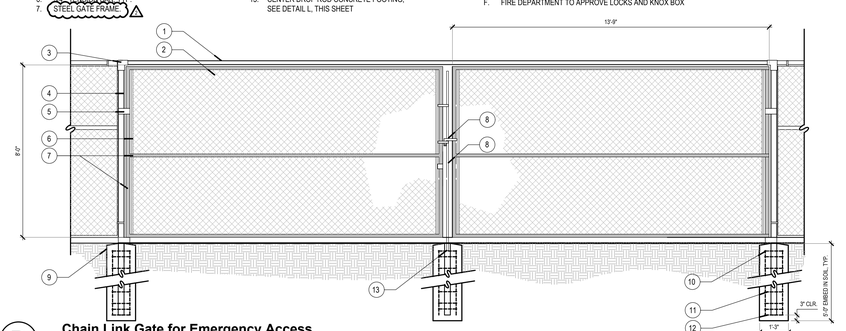
L Chain Link Fencing

Scale: 1/2"=1'-0"

1. STEEL TOP, MID, AND BOTTOM RAILS
2. CHAINLINK FABRIC, KNUCKLE SELVAGE ALL SIDES.
3. CLAMP, TYP. OF TWO (2)
4. DELETION (GATE POST, STEEL)
5. BUTT HINGE W/180 DEGREE SWING, TYP.
6. ¾" TENSION BAR, TYP.
7. STEEL GATE FRAME

8. CENTER DROP ROD ASSEMBLY
9. CONCRETE POST FOOTINGS, SEE DETAIL L, THIS SHEET
10. (2) #3 TIE, 3" O.C.
11. (7) #3 TIE, 6" O.C.
12. (6) #6 REBAR
13. CENTER DROP ROD CONCRETE FOOTING, SEE DETAIL L, THIS SHEET

NOTES:
A. REFER TO SPECS FOR FENCE MEMBER SIZES AND INFORMATION
B. REFER TO MASTER CONSTRUCTION LEGEND FOR ADDITIONAL INFORMATION
C. POST DIAMETER ARE STANDARD NOMINAL PIPE SIZE
D. REFER CONSTRUCTION PLANS FOR FENCE LENGTHS
E. VERIFY FENCE LAYOUT W/ LANDSCAPE ARCH. IN FIELD PRIOR TO INSTALLATION
F. FIRE DEPARTMENT TO APPROVE LOCKS AND KNOX BOX



D Chain Link Gate for Emergency Access

Scale: 3/8"=1'-0"

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AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

Chaffey College

HMC Architects
5009006-000
3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT
EPTDESIGN
844 EAST GREEN STREET, SUITE 201
PASADENA, CA 91101
626.795.2008
EPTDESIGN.COM

FACILITY:
CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
CONSTRUCTION DETAILS

ADDENDUM #2

FILE NO.: 36-C1 A# : 04-119722

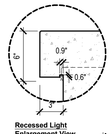
DATE: 06.17.2021 CLIENT PROJ NO:

SHEET:

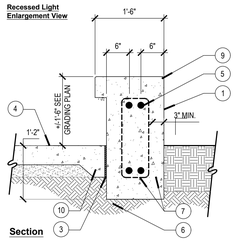
L1.52

PLEASE RECYCLE

IF THE LINE BROWN ABOVE IS
EXACTLY 1" LONG THEN THIS
SHEET IS ORIGINAL SHOP SIZE



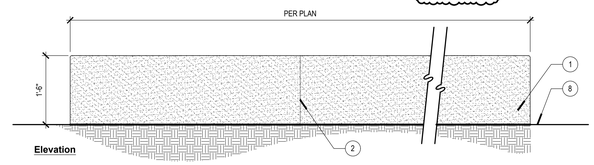
Recessed Light
Enlargement View



Section

1. POURED-IN-PLACE CONCRETE WALL. COLOR & FINISH PER MASTER CONSTRUCTION LEGEND. PITCH TOP TO DRAIN.
2. EXPANSION JOINT, ±5' O.C. TYPICAL. SPREAD EQUALLY ACROSS LENGTH OF WALL.
3. VERTICAL EXPANSION JOINT. SEE DETAIL C/L1.51
4. ADJACENT PAVING PER PLAN
5. 2 NO.4 REBAR TOP AND BOTTOM HORIZONTAL, CONTINUOUS
6. COMPACTED SUBGRADE PER GEOTECHNICAL REPORT
7. NO. 4 REBAR VERTICAL @ 12" O.C. WITH ALTERNATE BENDS IN FOOTING
8. FINISH SURFACE PER PLAN
9. 1/2" RADIUS, TYP.
10. THICKENED EDGE AT SEATWALL

NOTES:
A. CONTRACTOR TO PROVIDE FULL-SCALE MOCKUP
B. SKATE DETERRENTS TO BE INSTALLED, SEE DETAIL L, THIS SHEET



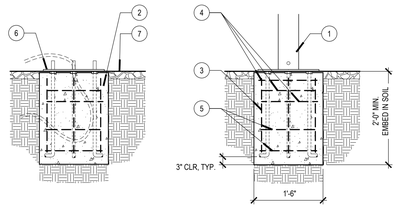
Elevation

E Concrete Benches - Entry Courtyard

Scale: 3/4"=1'-0"

1. LIGHT POLE PER ELECTRICAL PLAN
2. CONCRETE FOOTING
3. (6) #6 LONGITUDINAL ENFORCEMENT
4. #3 TIES @ 2" O.C.
5. #3 TIES @ 6" O.C.
6. LIGHT POLE BASE PLATE, SEAL WITH SILICONE PER MANUFACTURER'S RECOMMENDATION.
7. ADJACENT PLANTING AREA WITH MULCH LAYER

NOTES:
A. CONTRACTOR SHALL REFER TO STRUCTURAL ENGINEER'S PLANS FOR FOOTING DESIGN, STEEL REINFORCEMENT AND LIGHT POLE CONNECTIONS.
B. CONTRACTOR SHALL REFER TO ELECTRICAL ENGINEER'S PLANS FOR LIGHT POLE SPECIFICATIONS AND FOOTING CONNECTIONS.



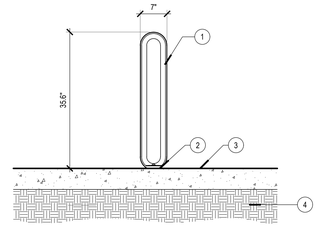
Section:
Base Plate
Installation

Section:
Installed

F Light Pole Base

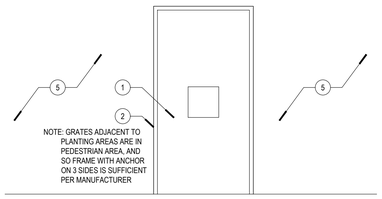
Scale: NTS

1. BICYCLE RACK - SEE MASTER CONSTRUCTION LEGEND FOR MORE INFORMATION.
2. SURFACE MOUNTED PER MANUFACTURER'S SPECIFICATIONS.
3. PAVING PER PLAN.
4. SUBGRADE COMPACTED PER GEOTECH REPORT.



B Bike Rack Mounting

Scale: 3/4"=1'-0"

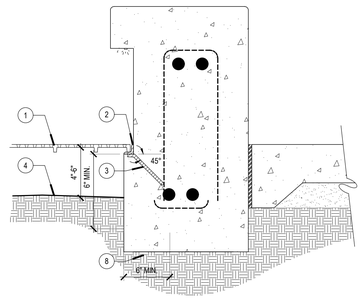


PA

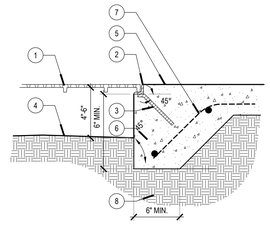
Plan of grate adjacent to PA
NTS

1. METAL TREE GRATE
2. ANGLE STOCK PERIMETER FRAME SIZED TO COORDINATE WITH GRATE THICKNESS, INSTALL PER MANUFACTURERS INSTRUCTIONS.
3. TYP. #3 REBAR EMBEDMENT ANCHOR 6" TYP. OVERALL LENGTH. INSTALL PER MANUFACTURER'S INSTRUCTIONS
4. FINISH GRADE AT TREE WELL
5. ADJACENT PAVING PER PLAN
6. THICKENED CONCRETE EDGE
7. REBAR AND SIZING PER CIVIL
8. COMPACTED SUBGRADE PER GEOTECH REPORT
9. CONCRETE BENCH, SEE E/L1.53

NOTES:
A. TREE GRATE MODEL AND FINISH PER MASTER CONSTRUCTION LEGEND.
B.



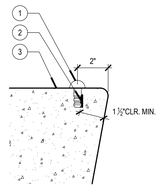
Section at grate adjacent to bench



Standard section

H Tree Grate

Scale: 1 1/2" = 1'-0"



1. HEMI GRINDERMINDER, INSTALL PER MANUFACTURER'S INSTRUCTIONS
2. PLACE SHIM LOCK ON SIDE
3. CONCRETE WALL OR BENCH PER PLAN

PROCEDURE:
A. DRILLING FREE-HAND, DRILL A ½" DIAMETER HOLE INTO CONCRETE WALL OR BENCH APPROXIMATELY 1 ½" DEEP. NOTE: THE CONCRETE DRILL SHOULD CREATE A HOLE THAT IS SLIGHTLY OVER ½"DIAMETER. THIS WILL ALLOW ROOM FOR THE LOCKING SHIM AND EPOXY
B. DRILL HOLE APPROXIMATELY 1-1/2" DEEP. THE ENTIRE STEM OF THE GRINDERMINDER SHOULD BE INSERTED SO THAT THE FLAT BOTTOM OF THE HEMISPHERE GRINDERMINDER IS FLUSH WITH THE SURFACE, SLIGHTLY SET IN FROM THE EDGE OF THE SEAT WALL
C. CLEAR ALL DEBRIS FROM THE DRILLED HOLE
D. PLACE ONE PIECE OF SHIM STOCK IN THE DRILLED HOLE ON THE SIDE OF THE HOLE
E. FILL THE HOLE APPROXIMATELY ONE-THIRD FULL WITH EPOXY
F. INSERT THE GRINDERMINDER INTO THE HOLE AND DRIVE IT INTO THE HOLE USING A RUBBER MALLET
G. CAREFULLY WIPE ANY EXCESS EPOXY FROM THE STONE AND GRINDERMINDER IMMEDIATELY
H. REPEAT THIS PROCESS FOR EACH GRINDERMINDER TO BE INSTALLED. GRINDERMINDERS SHOULD BE INSTALLED AT ROUGHLY 36" INTERVALS, BE SURE NOT TO INSTALL GRINDERMINDERS DIRECTLY INTO A MORTAR JOINT, AS THEY WILL BE MUCH EASIER FOR A VANDAL TO REMOVE.

L Hemisphere (Hemi) GrinderMinder Skate Deterrent

SA-1
W-2

Scale: 3" = 1'-0"

AGENCY APPROVAL:

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Chaffey College

HMC Architects

5009006-000

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ONTARIO, CA 91764
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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT

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844 EAST GREEN STREET, SUITE 201
PASADENA, CA 91101
626.795.2008
EPTDESIGN.COM

FACILITY:

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5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

CONSTRUCTION DETAILS

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

L1.53

2/13/2023, 3:47:43 PM

PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG AT THIS ORIGINAL DRAWING SIZE

WATER EFFICIENT LANDSCAPE WORKSHEET

Reference Evapotranspiration (ETo) 54.6 Project ETAF Project ETAF 0.45

Hydro-zone #	Planting Descriptions[a]	Plant Factor (PF)	Irrigation Method[b]	Irrigation Efficiency (IE)[c]	ETAF (PF/IE)	Landscape Area (sq. ft.)	Landscape Percentage	ETAF x Area	Estimated Total Water Use (ETWU)[d]
	Regular Landscape Areas								
						-	0%	-	-
						-	0%	-	-
						-	0%	-	-
						-	0%	-	-
						-	0%	-	-
					Subtotals	-	0%	-	-
	Special Landscape Areas								
1	Recycled water				1	58,285	100%	58,285.00	1,973,063.82
					1		0%	-	-
					1		0%	-	-
					1			-	-
					1			-	-
				Subtotals		58,285	100%	58,285.00	1,973,063.82
				Total Landscape Area		**58,285**	**100%**	**ETWU Total**	1,973,063.82
								ETWU (in acre-feet)	6.06
							Maximum Allowed Water Allowance (MAWA)[e]		1,973,063.82
								MAWA (in acre-feet)	6.055102475

[a] *Hydrozone/Planting Description*
E.g.
1) Front Lawn
2) Low water use plantings
3) Medium water use planting

[b] *Irrigation Method*
Overhead spray or drip

[c] *Irrigation Efficiency*
.75 for spray head
.81 for drip & Bubbler

[d] *ETWU (Annual Gallons Required) =* ETo x 0.62 x ETAF x Area
where 0.62 is conversion factor that converts acre-inches per acre per year to per square foot per year.

[e] *MAWA (Annual Gallons Allowed)* = *(ETo) (0.62)((ETAF x LA) + ((1-ETAF) x SLA))*
where 0.62 is conversion factor that converts acre-inches per acre per year to gallon per square foot per year, LA is the total landscape area in square feet, SLA is the total special landscape area in square feet, and ETAF is 0.55 for residential areas and 0.45 for non-residential areas

ETAF Calculations

Regular Landscape Areas

Total ETAF x Area	-
Total Area	0
Average ETAF	**0**

All Landscape Areas

Total ETAF x Area	58,285.00
Total Area	58,285
Sitewide ETAF	**1.00**

Average ETAF for Regular Landscape Areas must be 0.55 or below for residential areas, and 0.45 or below for non-residential area.

NOTE: ALL LANDSCAPE IS DESIGNATED "SPECIAL LANDSCAPE AREA" BECAUSE ALL AREAS TO BE IRRIGATED WITH RECYCLED WATER.

GENERAL IRRIGATION NOTES

1. The irrigation contractor shall be responsible for familiarizing themselves with all differences in grade, location of seatwalls, location of retaining walls, etc. The contractor shall be responsible for coordinating all irrigation work with the general contractor, electrical contractor, and all other subcontractors for the location and the installation of irrigation related sleeves through walls, structures, under roadways, paving, etc.
2. The irrigation design presented in these documents is intended to be diagrammatic. All irrigation equipment, piping and valve locations, etc. shown within paved areas are for design clarification and shall only be installed in planting areas. Irrigation contractor shall install all remote control valves, quick couplers, and gate valves, in shrub planting areas or as approved by owner's representative & the landscape irrigation designer. Avoid any conflicts between the sprinkler system, planting and architectural features.
3. The irrigation system design is based upon the minimum operating pressure and the maximum flow demand shown on the irrigation drawings at each point of connection. The irrigation contractor shall verify water pressure prior to construction. Any difference between the water pressure indicated on the drawings and the actual pressure reading at the irrigation point of connection shall be immediately reported in writing to the owner's authorized representative. If the pressure differences are not immediately reported prior to beginning construction, the irrigation contractor shall assume full responsibility for all revisions to the irrigation system deemed necessary by the owner's representative and all costs associated with those revisions.
4. When it is apparent to the landscape contractor in the field that obstructions, grade differences, or differences in the calculated area dimensions exist that may have not been considered in the design of the system, the irrigation contractor shall not willfully install the irrigation system as indicated on the construction drawings. The owner's authorized representative shall be notified in writing of any such obstructions or differences prior to beginning any irrigation installation. If notification is not received prior to beginning installation, the irrigation contractor shall assume full responsibility for all revisions to the irrigation system as deemed necessary by owner's representative and all costs associated with those revisions.
5. The irrigation contractor shall be responsible for installing all control wire sleeving of sufficient size, under all paved areas in addition to the control wire sleeving shown on the drawings.
6. All piping and equipment shall be installed per the irrigation details. Teflon tape or Teflon pipe dope shall be applied to all male PVC pipe threads on all irrigation valve assemblies.
7. All pop-up style irrigation heads located in in shrub or groundcover areas shall be installed so the top of the irrigation head is 1" above finish grade.
8. All pop-up style irrigation heads to be located in turf areas shall initially be installed so the top of the irrigation heads are flush with the adjacent sidewalk or curb. Within 10 days of being notified by the owner's representative, the irrigation contractor shall be responsible for adjusting all turf irrigation heads so the top of the irrigation head is 1/2" above finish grade.
9. The irrigation contractor shall be responsible for flushing and adjusting all irrigation heads for optimum performance and to prevent over spray onto areas not intended for irrigation. This shall include selecting the proper the arc pattern, adjusting the spray radius of the irrigation head with PRS screens and/or also throttling the flow control at each valve to obtain the optimum operating pressure for each system.
10. The irrigation contractor shall be responsible for adjusting the pressure regulator on each electric control valve so the irrigation head farthest and highest in elevation from its associated control valve functions within the operating pressure shown on the irrigation legend (not to exceed 5 PSI above the indicated operating pressure).
11. When installing Rain Bird 1800 series nozzles that require arc patterns other than the standard arc patterns (e.g., 360°, 180°, and 90°), the contractor shall use the appropriate fixed arc pattern (e.g. 120°, 240°, 270°). The contractor shall use Rain Bird variable arc nozzles (VAN) when installing irrigation heads using Rain Bird 1800 series nozzles only when required pattern is not one of the fixed arc patterns. Select the radius of VAN nozzles to match site conditions. For example: use 8-VAN when an 8 foot radius is required or a 12-VAN where a 12 foot radius is required.
12. The irrigation contractor shall be responsible for making field adjustments to the irrigation system by installing a quarter circle or half circle sprinkler head on each side of any vertical element (props, street lights, trees, etc.) which prevents proper coverage by interfering with the spray pattern of the irrigation head. All adjustments shall be made at no additional costs to the owner.
13. Drainage of irrigation water through spray head will not be allowed. Rain Bird SAM feature shall be used to prevent spray head drainage. During construction, the contractor shall change spray bodies from Rain Bird 1800-PRS to 1800-SAM-PRS for spray heads showing signs of draining after the irrigation system has operated from an ON to OFF position. Installation of Rain Bird SAM feature shall be included in the Bid Price of the irrigation system.
14. The irrigation contractor shall be responsible for making the final connection between the power source and the automatic controller. 120 volt electrical power source shall be provided by others at the automatic controller location.
15. Adhesives, sealants and caulks shall meet local or regional air pollution control or south coast AQMD rule 1168 VOC and statewide VOC standards.
16. Contractor shall verify exterior mounted rain sensor location and provide wiring between rain sensor and controller.
17. Heat stamp all boxes with clock number, and valve number, typical.
    Ball Valves "BV##"
    Quick Couplers "QC##"
    Mastr Valves "MV##"
    Isolation Valves "IV##"
18. Lightly stamp concrete with butt end of 1" PVC pipe wherever a sleeve is installed under the concrete (both sides), typical.
19. Specify a tag with a valve number on all valves installed underground.
20. Add Ball Valves in front of cylinoid valves for ease of replacements in the future, typ.

OBSERVATION SCHEDULING

The landscape contractor shall schedule an irrigation site observation by the irrigation designer, and/or the owner's representative, which shall not occur without at least 48 hours prior notification. The following items shall be reviewed:

1. Pre-job/kick-off meeting with contractor, general contractor, and irrigation designer.
2. Mainline, backflow preventer, master valves, flow sensors, booster pump installation and operation, installation review prior to backfilling trenches, irrigation mainline pressure test, etc.
3. Finalizing the location for the controller assemblies - landscape contractor shall coordinate with the irrigation designer to verify connection of flow sensors and associated equipment to each controller assembly and for certification/warranty of equipment.
4. Irrigation coverage test - a dynamic pressure test shall be performed by the landscape contractor and shall be observed by the owner (or the owner's representative) and the irrigation designer for each valve during the irrigation coverage test.

IRRIGATION CONSTRUCTION NOTES

1 POC NOTE

The landscape contractor shall purchase and install one 2" reclaimed water meter located per the civil engineer's sewer & water plan and as shown on the irrigation plan. Verify that the static pressure is 120 PSI prior to construction. Contractor shall furnish and install mainline to the flanged gate valves, backflow preventer, quick couplers, master valve, and flow sensor per the irrigation legend and details. (Refer to the irrigation plans for sizing). Refer to irrigation legend and irrigation construction notes for model numbers. Install the flow sensor per the manufacturer's recommendations and details. Contractor shall furnish all materials and labor to execute and install the irrigation system per the irrigation plans.

Install the gate valves, backflow preventer, master valves, flow sensors, and quick couplers within the shrub planting areas only.

The flow sensor wire shall be manufactured by "Rain Master", model #EV-CAB-SEN. No field splices allowed between flow sensor and controller. All flow sensor wires shall be installed within a gray 1-1/2" DIA., SCH. 40 PVC conduit. Each conduit shall have a separate flow sensor cable installed within it based on the corresponding controller assembly. Imperial Technical Services shall make the final connections from the flow sensor to the controller assemblies.

Mainline shown in hardscape areas is diagrammatic. Mainlines are intended to be installed within the shrub areas only. Any mainline, lateral, or control wires that run under hardscape areas shall be installed in SCH. 40 PVC sleeves which shall be sized a minimum of twice the diameter of the actual pipe diameter. Refer to irrigation details for installation and depths of sleeving.

CONTROLLER INFORMATION

2 CONTROLLER NOTE

MANUFACTURER: RainBird
TYPE: Modular Controller
ASSEMBLED BY: RainBird

CONTROLLER IDENTIFICATION	CONTROLLER PART NUMBER
A	ESP-LXME-FS-MP

INTERNET REQUIRED: YES, WIFI CONNECTION
FLOW SENSOR CABLE: YES
Install flow sensor cable in a 1 1/2" U.L. PVC SCH. 40 gray conduit.

The 120 volt power supply connection to the irrigation controller assembly shall be the responsibility of the irrigation contractor. Refer to electrical plans for additional information. Final location of the irrigation controller assembly shall be approved by the owner's authorized representative prior to installation. All sprinkler heads shall be field adjusted to prevent over spray onto the irrigation controller assembly enclosure.

The system is designed for the operation of one valve at a time per controller. The system has been designed for one valve opening and one valve closing.

The controller shall be located as shown on the drawings or as directed by the owner's authorized representative.

Contractor to determine best way to provide internet connectivity for controller in prioritized order per site conditions. Ethernet cable, WIFI, cellular. Components in controller to provide internet connectivity will vary.

PRESSURE CALCULATIONS FOR DOMESTIC IRRIGATION

Project Name and/or Tract#: 1
Date and Source of Information: 12/08/20
Name of Contact Person and Phone Number:
P.O.C. Water Meter #: 1
Water Meter Size and Type: 2" Reclaimed Water Meter
Hydraulic Grade Level: FT
Water Meter Elevation: 655 FT
Highest Head Elevation on the System: 660 FT
Basis for Calculations: Highest GPM Demand

Remote Control Valve#: A5

Size of Remote Control Valve: 1.5"
Demand at Remote Control Valve: 34 GPM

QUANTITY	SIZE	DESCRIPTION	FLOW (GPM)	LOSS (PSI)
1	2"	Water Meter	34	0
1	2"	Backflow RP	34	10
		Pressure Regulator		
2	2"	Gate Valve(s)	34	0
		Gate Valve(s)		
1	2"	Master Valve	34	0
1	2"	Flow Sensor	34	0
99 LF	2"	Mainline	34	1
-	-	Mainline	-	-
		Mainline		
		Mainline		
1	2"	Remote Control Valve	34	3
		Lateral Line Losses(10%)		2
		Other Losses (10%)		2
		Elevation Loss or Gain GAIN		1
		Total		19

PRESSURE (PSI)

Pressure Required to Operate Irrigation Head	50
Sub-Total Pressure Required for Irrigation System	69
Total Pressure Required for Irrigation System (Sub-Total Pressure + 25%)	86.25
Static Pressure Available	120
Residual Pressure (Subtract Total Pressure from Static Pressure)	33.75

IRRIGATION LEGEND

SYMBOL	RAD.	MANF.	MODEL NO. WITH NOZZLE SIZE & TYPE	DESCRIPTION	PSI	FLOW RATE IN GPM F	H	Q	A (VAR)	DETAIL
○ ○ F H Q A	8-14'	RainBird	R-VAN 14 adjustable on RD-06-S-P45-NP	Pop-Up Turf Rotary Nozzle	40	-	.42	.23	-	J/L2.51
●	-	RainBird	RWS-B-C-1402 (.50 GPM) w/ RWS-GRATE-P	Bubbler in Sleeve with Purple Grate Cap	30	.50	-	-	-	K/L2.51
○	-	RainBird	1402 on RD04-S-P30-NP w/ PA-80	Flood Bubbler on 4" pop-up Spray Head	30	.50	-	-	-	J/L2.51
■	-	RainBird	1401 on RD04-S-P30-NP w/ PA-80	Flood Bubbler on 4" pop-up Spray Head	30	.25	-	-	-	J/L2.51
◓	-	RainBird	5-CST-B on RD06-S-P30-NP w/ PA-80	Stream Bubbler on 6" pop-up Spray Head	30	.38	-	-	-	J/L2.51
2 2 1	39'	RainBird	5006-+-SAM-R-NP-SS with 3.0 nozzle	6" Pop-Up Rotor w/ Stainless Steel Riser	50	5.8				J/L2.51
2 2 1	39'	RainBird	5006-+-SAM-R-NP-SS with 3.0 nozzle	6" Pop-Up Rotor w/ Stainless Steel Riser	50	-	2.8	-	-	J/L2.51
2 2 1	39'	RainBird	5006-+-SAM-R-NP-SS with 3.0 nozzle	6" Pop-Up Rotor w/ Stainless Steel Riser	50	-	-	1.2	-	J/L2.51
		RainBird	Irrigation Dripline (Shrub) - XFS-P-06-18	Space lateral rows at 18". Dripper spacing at 18". Install 3" min - 6" max below grade per specifications. Application rate: 0.43 in/hr. Time to apply 1/4": 36 minutes.	30	0.6 GPH Flow Rate				M,N/L2.51
		RainBird	Irrigation Dripline (Turf) - XFS-P-06-12	Space lateral rows at 12". Dripper spacing at 12". Install on top of soil per manufacturer's specifications. Application rate: 0.64 in/hr. Time to apply 1/4": 24 minutes.	30	0.6 GPH Flow Rate				M,N/L2.51
		Netafim	TLSOV - Manual Flush Valve	Install per manufacturers specifications.						L/L2.51
		RainBird	Drip Connector							-
		RainBird	OPERIND	Install per manufacturers specifications.						-
RW	-		2" Reclaimed Water Meter Per Civil	See the civil engineers plans for additional information						B/L2.52
		RainBird	IMB-S3 - Basket Strainer	For reclaimed water service - size per plan. Install in purple Carson Valve Box						-
		Nibco	T-111 Gate Valve	For mainline sizes 3" and larger, use Nibco F-619-SON, epoxy coated. Assemble with stainless steel hardware. Install in a 10" round value box.						I/L2.51
MV		RainBird	Superior 2" Master Valve, normally closed	Master Valve to be installed in rectangle valve box adjacent to flow sensor.						A/L2.51
FS		RainBird	FS-200-P Flow Sensor	Size per plan. Install per detail. See irrigation construction notes for additional information and model numbers.						B/L2.51
		RainBird	33-DNP - 3/4" Quick Coupler Valve	Quick coupler valve with purple locking rubber cover. Install in purple round Carson Valve Box per detail.						H/L2.51
		RainBird	EFB-CP-PRS-D - Remote Control Valve	Remote control valve, angle flow pattern, purple colored flow control handle, size per plan. Install in purple rectangle Carson Valve Box.						F/L2.51
		RainBird	XCZ-PRB-100-COM - up to 25 GPM XCZ-PRB-150-COM - up to 35 GPM	Remote control valve kit with pressure regulating basket filter. Install in purple rectangle Carson Valve Box per detail.						G/L2.51
A		RainBird	ESP-LXME-FS-MP - Controller	Irrigation controller assembly with flow sensing and ET capability located per irrigation plans. See irrigation construction notes for more information.						D/L2.51
			Existing Reclaimed Water Mainline	Protect in place.						-
			Reclaimed Water Mainline	Irrigation Mainline - Use purple pipe for all irrigation piping. PVC SCH. 40 IPS for mainline sizes 1" to 2" PVC Class 315 IPS for mainline sizes 2" and greater. Sleeve mainline per notes and details.						C,E/L2.51
			Lateral Line	Lateral Pipe - Use purple pipe for all irrigation piping. Minimum pipe size shall be 3/4" - size laterals per plan. PVC SCH. 40 IPS for sizes 3/4" to 2 1/2" PVC Class 315 IPS for sizes 3" and larger						C,E/L2.51
			PVC Sleeves	PVC SCH. 40 IPS purple pipe - sleeves shall be installed for any mainline, lateral, or wires crossing under hardscape per irrigation construction notes. Size to be two times the pipe diameter or wire bundle.						E/L2.51

IRRIGATION VALVE CALLOUT:

Station No.
GPM
Plant Type
Valve Size

LATERAL LINE SIZING CHART

3/4"	
1"	
1 1/4"	
1 1/2"	
2"	
2 1/2"	
3"	

NOTE: THE LATERAL SIZE BETWEEN TWO IDENTICAL TICK MARKS SHALL BE SIZED THE SAME. MINIMUM PIPE SIZE IS 3/4".

PLANT MATERIAL ABBREVIATIONS:

Plant Type:
TF Turf
SB Shrub / Ground Cover
TR Trees
PT Pots

Hydrozone:
H High
M Medium
L Low

DOMESTIC WATER POINT OF CONNECTION EQUIPMENT SIZES:

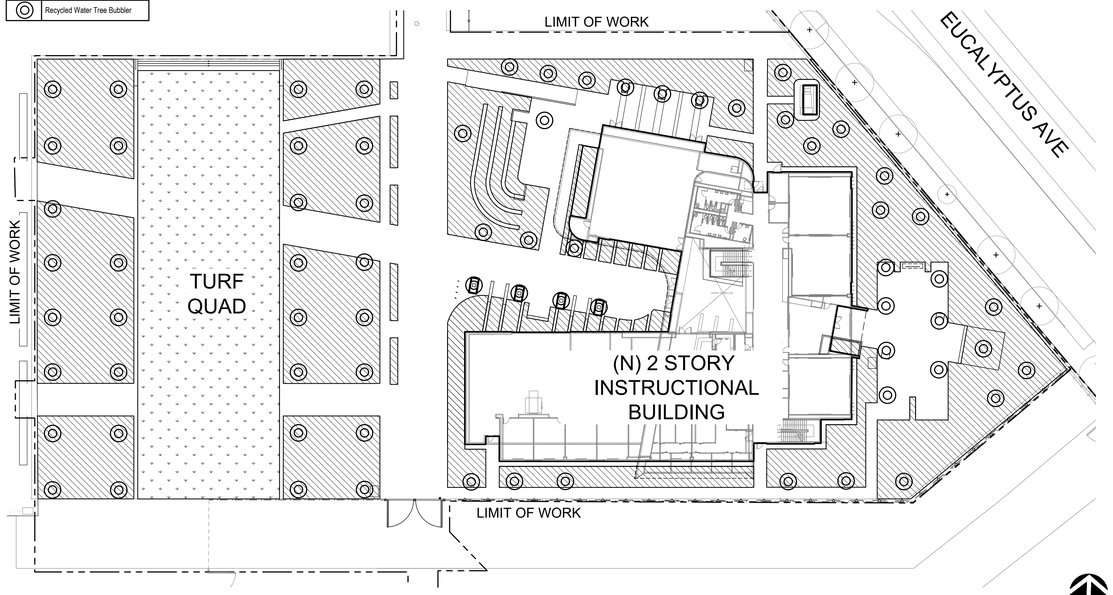
P.O.C. #			
WM	BF	MV	FS
XX	XX	XX	XX
CONTROLLER X			

DOMESTIC WATER METER LOCATION SEE IRRIGATION CONSTRUCTION NOTE # 1 ON SHEET 12.XX

POC = WATER METER
WM = WATER METER
BF = BACK FLOW
MV = MASTER VALVE
FS = FLOW SENSOR

HYDROZONE LEGEND

	Recycled Water Drip Irrigation
- - -	Recycled Water Spray Irrigation
◎	Recycled Water Tree Bubbler



A Hydrozone Plan
Scale: 1/32" = 1'-0"

HYDROZONE PLAN & IRRIGATION SCHEDULE

PLEASE RECYCLE

2/13/2020 3:47:43 PM

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

Chaffey College

HMC Architects
5009006-000
3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 0979 / www.hmcarchitects.com

NOT FOR CONSTRUCTION

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

CONSULTANT

EPTDESIGN
844 EAST GREEN STREET, SUITE 201
PASADENA, CA 91101
626.795.2008
EPTDESIGN.COM

FACILITY:
CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:
CHINO INSTRUCTIONAL BUILDING

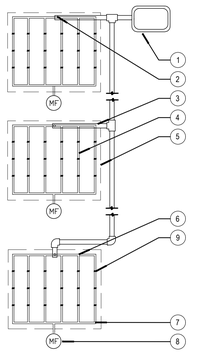
SHEET NAME:
IRRIGATION SCHEDULE, NOTES & HYDROZONE PLAN

ADDENDUM #2

FILE NO.: 36-C1 A# : 04-119722
DATE: 06.17.2021 CLIENT PROJ NO:
SHEET:

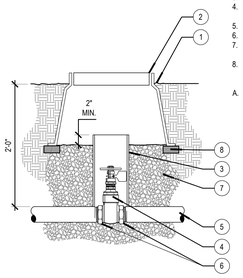
L2.00

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON ALL SHEETS ORIGINAL PAPER SIZE



1. REMOTE CONTROL VALVE WITH DISC FILTER AND PRESSURE REGULATING VALVE
2. DRIP TUBING START CONNECTION MALE ADAPTER
3. PVC OR POLY SUPPLY HEADER
4. DRIP TUBING. SEE LEGEND FOR EMITTER AND LATERAL LINE SPACING
5. ISLAND PERIMETER
6. DRIP TUBING TEE
7. DRIP TUBING ELL
8. MANUAL FLUSH VALVE PLUMBED TO DRIP TUBING
9. DRIPLINE STAPLES @ 10' O.C.

M Dripline Island Layout
Scale: NTS

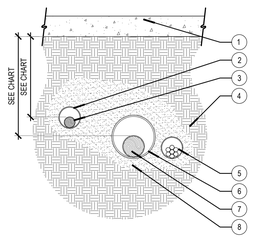


1. FINISH GRADE
   - 1/2" FROM TOP OF BOX LID IN TURF
   - 1 1/2" FROM TOP OF BOX LID IN SHRUB/GC
2. ROUND, PLASTIC VALVE BOX WITH LOCKING COVER SHALL BE BRANDED "GV" - REFER TO IRRIGATION LEGEND
3. 6" Ø PVC PIPE EXTENSION - LENGTH AS REQUIRED
4. GATE VALVE - REFER TO IRRIGATION LEGEND FOR SPECS.
5. PVC MAINLINE - REFER TO IRRIGATION LEGEND
6. PVC MALE ADAPTER - TWO (2) REQUIRED
7. PEA GRAVEL - TWO (2) CUBIC FEET AT BASE OF VALVE
8. BRICK (1 OF 4)

NOTE:
A. ALL THREADS SHALL BE WRAPPED WITH TEFLON TAPE

I Gate Valve
Scale: 1"=1'-0"

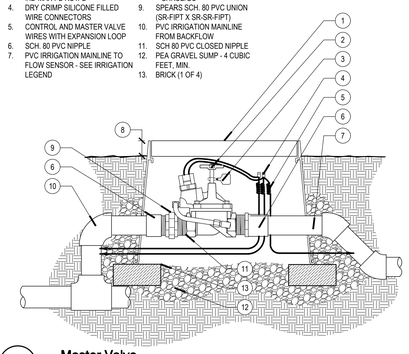
LINE TYPE	LOCATION	DEPTH
PRESSURIZED MAINLINE	IN LANDSCAPE	24"
	UNDER VEH. PAVING	36"
LATERAL LINES	IN LANDSCAPE	18"
	UNDER VEH. PAVING	30"



1. VEHICULAR or PEDESTRIAN PAVING - REFER TO CONSTRUCTION LAYOUT PLANS FOR SPECIFIC CONDITION
2. LATERAL LINE SLEEVING SHALL BE SCH. 40 PVC - SLEEVE DIA. SHALL BE 2 x LATERAL DIA.
3. LATERAL LINE - REFER TO SPECIFICATIONS
4. BACKFILL - 90% RELATIVE COMPACTION, MINIMUM - REFER TO GEOTECHNICAL REPORT
5. CONTROL WIRE BUNDLE SLEEVING SHALL BE SCH. 40 PVC PIPE
6. MAINLINE SLEEVING SHALL BE SCH. 40 PVC PIPE - SLEEVE DIA. SHALL BE 2 x MAINLINE DIA.
7. MAINLINE - REFER TO SPECIFICATIONS
8. SAND BACKFILL - 6" BASE & 6" OF COVER, MIN.

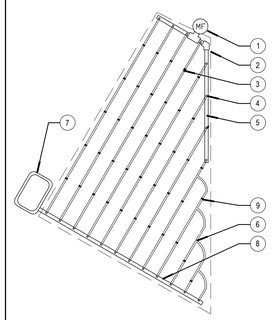
NOTES:
A. ALL IRRIGATION WIRES, LATERALS AND MAINLINE UNDER HARDSCAPE SHALL BE PLACED IN SLEEVES
B. IRRIGATION CONTRACTOR SHALL COORDINATE ALL SLEEVING LOCATIONS & SIZES WITH HARDSCAPE CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION
C. ALL SLEEVES SHALL EXTEND A MINIMUM OF 12" BEYOND THE EDGE OF THE HARDSCAPE SURFACE

E Irrigation Sleeving
Scale: 1"=1'-0"



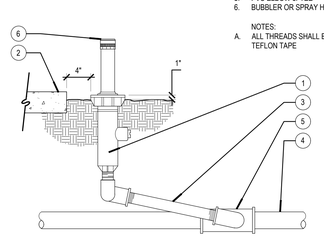
1. PLASTIC VALVE BOX
2. MASTER VALVE PER LEGEND
3. CHRISTY'S TAG #ID-MAX-P2-RC1P2
4. DRY CRIMP SILICONE FILLED WIRE CONNECTORS
5. CONTROL AND MASTER VALVE WIRES WITH EXPANSION LOOP
6. SCH. 80 PVC NIPPLE
7. PVC IRRIGATION MAINLINE TO FLOW SENSOR - SEE IRRIGATION LEGEND
8. FINISH GRADE
   - ¾" BELOW BOX LID IN TURF
   - 1 ½" BELOW BOX LID IN SHRUB/GC
9. SPEARS SCH. 80 PVC UNION (SR-FIPT X SR-SR-FIPT)
10. PVC IRRIGATION MAINLINE FROM BACKFLOW
11. SCH 80 PVC CLOSED NIPPLE
12. PEA GRAVEL SUMP - 4 CUBIC FEET, MIN.
13. BRICK (1 OF 4)

A Master Valve
Scale: 3"=1'-0"



1. MANUAL FLUSH VALVE PLUMBED TO PVC OR POLY
2. AREA PERIMETER
3. DRIP TUBING. SEE LEGEND FOR EMITTER AND LATERAL LINE SPACING
4. DRIP TUBING START CONNECTION MALE ADAPTER
5. PVC OR POLY EXHAUST HEADER
6. DRIP TUBING TEE
7. REMOTE CONTROL VALVE WITH DISC FILTER AND PRESSURE REGULATING VALVE
8. PVC OR POLY SUPPLY HEADER
9. DRIPLINE STAPLES @ 10' O.C.

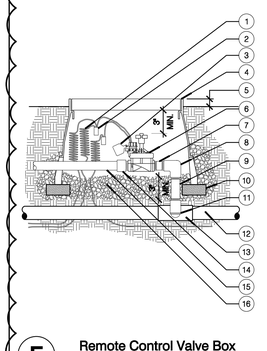
N Dripline Layout - Irregular Areas
Scale: NTS



1. RAINBIRD SPRAY BODY
2. PAVING EDGE, HEADER OR WALL
3. RAIN BIRD SA-SERIES SWING JOINT 12" MIN. FOR 6" POPUPS
4. PVC LATERAL LINE
5. PVC ELBOW or TEE
6. BUBBLER OR SPRAY HEAD PER PLAN

NOTES:
A. ALL THREADS SHALL BE WRAPPED WITH TEFLON TAPE

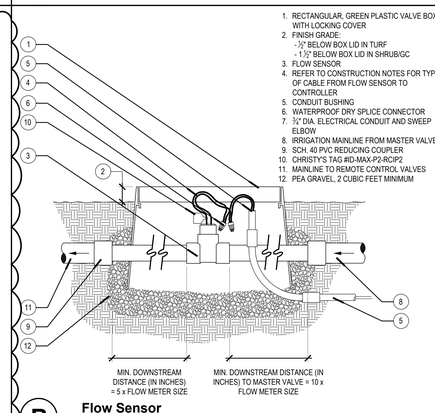
J Popup Stream Bubbler/Spray
Scale: 1 1/2"=1'-0"



1. 30" LENGTH OF COILED WIRE
2. WATER PROOF CONNECTOR - REFER TO IRRIGATION SPECIFICATIONS
3. CHRISTYS TAG #ID-MAX-PS-RC1P2
4. RECTANGULAR, PLASTIC VALVE BOX WITH LOCKING COVER - LID SHALL BE HEAT BRANDED WITH LETTERS "RCV" & STATION NUMBER - REFER TO IRRIGATION SPECIFICATIONS
5. FINISH GRADE:
   - 1/2" FROM TOP OF BOX LID IN SHRUB/GC
   - 1 ½" FROM TOP OF BOX LID IN SHRUB/GC
6. REMOTE CONTROL VALVE - REFER TO IRRIGATION LEGEND
7. SCH. 80 PVC NIPPLE (CLOSE)
8. SCH. 40 PVC ELL
9. SCH. 80 PVC NIPPLE (LENGTH AS REQUIRED)
10. BRICK (1 OF 4)
11. SCH. 80 PVC NIPPLE (2" LENGTH, HIDDEN) AND SCH. 40 PVC ELL
12. PVC MAINLINE PIPE
13. SCH. 40 PVC TEE OR ELL
14. SCH. 40 PVC MALE ADAPTER
15. PVC LATERAL PIPE
16. (3) CUBIC FEET, MIN. OF ¾" MINUS, WASHED GRAVEL

NOTE:
A. ALL THREADS SHALL BE WRAPPED WITH TEFLON TAPE

F Remote Control Valve Box
Scale: 1 1/2"-1'-0"



1. RECTANGULAR, GREEN PLASTIC VALVE BOX WITH LOCKING COVER
2. FINISH GRADE:
   - ½" BELOW BOX LID IN TURF
   - 1 ½" BELOW BOX LID IN SHRUB/GC
3. FLOW SENSOR
4. REFER TO CONSTRUCTION NOTES FOR TYPE OF CABLE FROM FLOW SENSOR TO CONTROLLER
5. CONDUIT BUSHING
6. WATERPROOF DRY SPLICE CONNECTOR
7. ¾" DIA. ELECTRICAL CONDUIT AND SWEEP ELBOW
8. IRRIGATION MAINLINE FROM MASTER VALVE
9. SCH. 40 PVC REDUCING COUPLER
10. CHRISTY'S TAG #ID-MAX-P2-RC1P2
11. MAINLINE TO REMOTE CONTROL VALVES
12. PEA GRAVEL, 2 CUBIC FEET MINIMUM

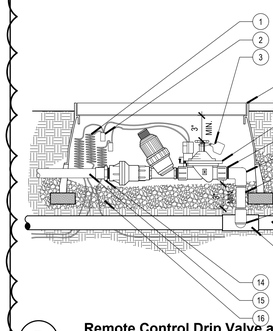
B Flow Sensor
Scale: 3"=1'-0"

1 4-INCH GRATE
2 ROOT WATERING SYSTEM: RAIN BIRD RWS-BCG (INCLUDES BUBBLER, CHECK VALVE AND GRATE)
3 BUBBLER
4 FINISH GRADE
5 CHECK VALVE
6 OPTIONAL PEA GRAVEL FOR SANDY SOILS
7 1/2-INCH PVC SCH 80 NIPPLE
8 1/2-INCH 90-DEGREE ELBOW
9 SWING PIPE, 12-INCH SWING ASSEMBLY
10 1/2-INCH MALE NPT INLET
11 PVC SCH 40 TEE OR EL
12 LATERAL PIPE
13 4-INCH BASKET WEAVE CANISTER

NOTE:
1. EQ. SPACE TYP. BETWEEN TRUNK AND CANOPY EDGE

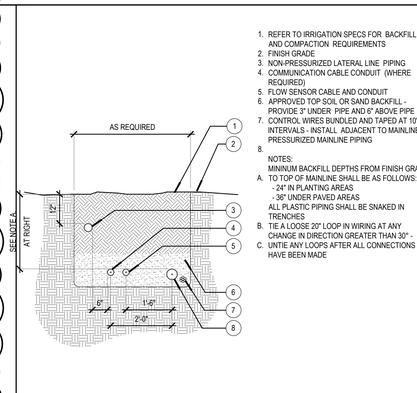
K Root Watering System
NTS

NOTE:
A. ALL THREADS SHALL BE WRAPPED WITH TEFLON TAPE



1. 30" LENGTH OF COILED WIRE
2. WATER PROOF CONNECTOR - REFER TO IRRIGATION SPECIFICATIONS
3. ID TAG - REFER TO IRRIGATION SPECIFICATIONS
4. RECTANGULAR, GREEN PLASTIC VALVE BOX WITH LOCKING COVER - LID SHALL BE HEAT BRANDED WITH LETTERS "RCV" & STATION NUMBER - REFER TO IRRIGATION SPECIFICATIONS
5. FINISH GRADE:
   - ½" FROM TOP OF BOX LID IN TURF
   - 1 ½" FROM TOP OF BOX LID IN SHRUB/GC
6. REMOTE CONTROL VALVE WITH FILTER AND PRV - REFER TO IRRIGATION LEGEND
7. SCH. 80 PVC NIPPLE (CLOSE)
8. SCH. 40 PVC ELL
9. SCH. 80 PVC NIPPLE (LENGTH AS REQUIRED)
10. BRICK (1 OF 4)
11. SCH. 80 PVC NIPPLE (2" LENGTH, HIDDEN) AND SCH. 40 PVC ELL
12. PVC MAINLINE PIPE
13. SCH. 40 PVC TEE OR ELL
14. SCH. 40 PVC MALE ADAPTER
15. PVC LATERAL PIPE
16. (3) CUBIC FEET, MIN. OF ¾" MINUS, WASHED GRAVEL

G Remote Control Drip Valve and Filter
Scale: 1 1/2"-1'-0"

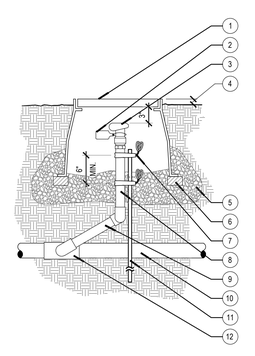


1. REFER TO IRRIGATION SPECS FOR BACKFILL AND COMPACTION REQUIREMENTS
2. FINISH GRADE
3. NON-PRESSURIZED LATERAL LINE PIPING
4. COMMUNICATION CABLE CONDUIT (WHERE REQUIRED)
5. FLOW SENSOR CABLE AND CONDUIT
6. APPROVED TOP SOIL OR SAND BACKFILL - PROVIDE 2" UNDER PIPE AND 6" ABOVE PIPE
7. CONTROL WIRES BUNDLED AND TAPED AT 10'-0" INTERVALS - INSTALL ADJACENT TO MAINLINE PRESSURIZED MAINLINE PIPING
8. NOTES:
   MINIMUM BACKFILL DEPTHS FROM FINISH GRADE
   A. TO TOP OF MAINLINE SHALL BE AS FOLLOWS:
      - 24" IN PLANTING AREAS
      - 36" UNDER PAVED AREAS
      ALL PLASTIC PIPING SHALL BE SNAKED IN TRENCHES
   B. TIE A LOOSE 20" LOOP IN WIRING AT ANY CHANGE IN DIRECTION GREATER THAN 30°
   C. UNTIE ANY LOOPS AFTER ALL CONNECTIONS HAVE BEEN MADE

C Trenching Detail
Scale: 1/2"=1'-0"

1. FINISH GRADE
2. VALVE BOX, SEE SPECS.
3. LINE FLUSHING VALVE TLSOV BY NETAFIM
4. BRICK SUPPORTS (3)
5. ¾" GRAVEL SUMP (1 CUBIC FT.)
6. 17mm PVC LATERAL (OR EXHAUST HEADER)

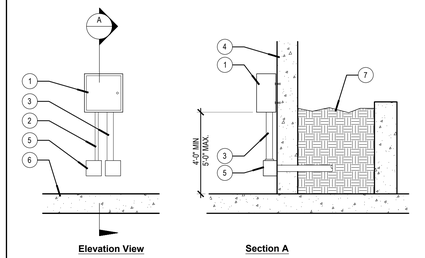
L Manual Line Flushing Valve - Plumbed to PVC
Scale: NTS



1. 10" ROUND VALVE BOX WITH BOLT DOWN COVER, HEAT BRANDED "QCV"
2. WATER ID TAG
3. QUICK COUPLER VALVE - REFER TO IRRIGATION LEGEND
4. FINISH GRADE:
   - 1/2" BELOW BOX LID IN TURF AREAS
   - 1 1/2" BELOW BOX LID IN SHRUB/GC AREAS
5. ONE (1) CU. FT. (MIN.) OF 3/4" CRUSHED ROCK AT BASE OF VALVE BOX
6. SUPPORT - COMMON RED BRICK
7. V.I.T. STAINLESS STEEL TIES - TYPICAL
8. SCH. 80 PVC NIPPLE - LENGTH AS REQUIRED
9. 1" DIA. SCH. 80 PVC SWING JOINT - PREASSEMBLED BY SPEARS
10. PVC MAINLINE
11. 1/2" DIA. x 24" LENGTH GALVANIZED PIPE STAKE
12. SCH. 80 PVC TEE FITTING

NOTES:
A. ALL THREADS SHALL BE WRAPPED WITH TEFLON TAPE
B. 12" MIN. CLEAR SPACE SHALL BE MAINTAINED BETWEEN THE QUICK COUPLER VALVE BOX AND ANY ADJACENT HARDSCAPE - WHERE OCCURS
C. ADD BALL VALVES ON PRIMARY SIDE. TYP. ALL QUICK COUPLERS

H Quick Coupler Valve
Scale: 3/4"=1'-0"



1. IRRIGATION CONTROLLER, PER PLAN. MOUNT TO WALL PER MANUF. SPECS.
2. SCH 80 PVC CONDUIT, SIZE AS REQ., TO 120V POWER SUPPLY.
3. SCH 80 PVC CONDUIT, SIZE AS REQ., FOR IRRIGATION CONTROL WIRES AND MASTER VALVE/FLOW SENSOR WIRES. PROVIDE PVC SWEEP ELL BELOW GRADE.
4. FACE OF WALL ON INSIDE OF GARAGE
5. JUNCTION BOX
6. FINISH SURFACE
7. PLANTER ON OUTSIDE

NOTES:
A. INSTALL ALL WIRING PER LOCAL CODE.
B. ALL CONDUIT ABOVE GRADE TO BE SCH 80 PVC OR RIGID GALV. STEEL.

D Wall Mounted Controller
NTS

AGENCY APPROVAL:

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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

IRRIGATION DETAILS

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

L2.51

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PLEASE RECYCLE

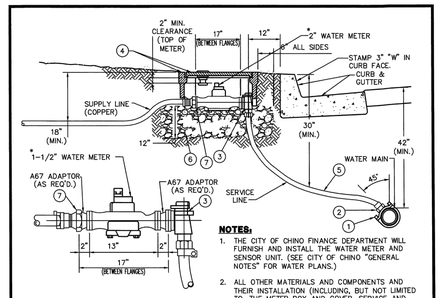
THIS LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG AT THIS PLOTTED SCALE OF 100%

C

LETTERS: 3/4" HIGHWAY FONT & 3/4" ARIAL ITALIC FONT AS SHOWN.

APPROVED	CITY ENGINEER	DATE	CITY OF CHINO PUBLIC WORKS DEPARTMENT	
		4/20/16		
DATE	REVISION	BY	STANDARD DRAWING	No.
			RECYCLED WATER SIGN	485 A

B



NOTES:

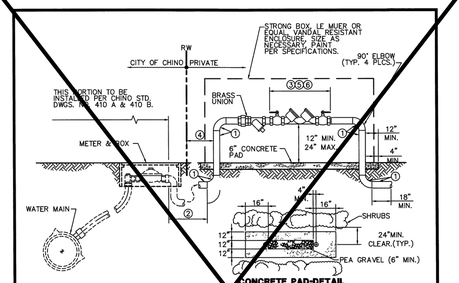
1. THE CITY OF CHINO FINANCE DEPARTMENT WILL FURNISH AND INSTALL THE WATER METER AND SENSOR UNIT. (SEE CITY OF CHINO "GENERAL NOTES" FOR WATER PLANS.)
2. ALL OTHER MATERIALS AND COMPONENTS AND THEIR INSTALLATION (INCLUDING, BUT NOT LIMITED TO, THE METER BOX AND COVER, SERVICE AND SUPPLY LINES, VALVES ADAPTORS, COUPLINGS AND FITTINGS) SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR/DEVELEOPER.
3. WATER METER SHALL BE CENTERED IN THE METER BOX

ITEM	DESCRIPTION	FORD	JONES	MUELLER	REMARKS
1	SERVICE SADDLE	202B	J-979	H16100	ALL SADDLES W/IP THD.
2	CORP. STOP, 2"	FB 1700	J-1935	B-25028	KEY UP OR ON SIDE
3	ANGLE METER STOP, 2"	FV43-777W	J-1975 W	B-24276	W/ELONGATED HOLE FOR 1-1/2"
4	METER BOX & COVER (AS SPECIFIED BY THE CITY ENGINEER)	– – –	– – –	– – –	ARMOR CAST: A500153412 (BOX) A6001643-H9 OR (COVER) A6001643-H7
5	2" COPPER TUBE, TYPE K OR 2" CTS POLYETHELENE TUBE	– –	– –	– –	FULL LENGTH FULL LENGTH
6	1/2" CMB	–	–	–	12" BASE ALL AROUND
7	2" BRONZE METER FLANGE	7F	–	–	

APPROVED	CITY ENGINEER	DATE	CITY OF CHINO PUBLIC WORKS DEPARTMENT	
		3/7/12		
DATE	REVISION	BY	STANDARD DRAWING	No.
			STANDARD WATER SERVICE 1 1/2" OR 2" METER	410 A

A

△ NOT APPLICABLE



CONCRETE PAD-DETAIL

NOTES:

1. ALL PIPE AND FITTINGS SHALL BE COPPER, TYPE K, OR APPROVED EQUAL.
2. NO CONNECTION SHALL BE MADE BETWEEN THE METER AND THE BACKFLOW ASSEMBLY, UNLESS APPROVED IN WRITING BY THE CITY ENGINEER.
3. BACKFLOW ASSEMBLY SHALL BE APPROVED BY THE U.S.C. FOUNDATION FOR CROSS CONNECTION CONTROL.
4. BACKFLOW ASSEMBLY SHALL BE INSTALLED AS CLOSE TO THE PROPERTY LINE AS POSSIBLE. OTHER LOCATIONS SHALL BE APPROVED BY THE CITY ENGINEER.
5. BACKFLOW ASSEMBLY SHALL BE INSTALLED HORIZONTAL AND LEVEL UNLESS AN ALTERNATIVE ORIENTATION IS APPROVED BY U.S.C. FOUNDATION FOR CROSS CONNECTION CONTROL.
6. BACKFLOW ASSEMBLY MAY BE LOCATED WITHIN LANDSCAPE AREAS, OR SCREENED FROM PUBLIC VIEW. LOCATION SHALL BE APPROVED BY THE CITY ENGINEER.
7. BACKFLOW PREVENTION ASSEMBLIES INSTALLED ON A RECYCLED WATER SYSTEM SHALL BE LABELED/MARKED/PAINTED PURPLE (PANTONE #512 OR APPROVED EQUAL).

APPROVED	CITY ENGINEER	DATE	CITY OF CHINO PUBLIC WORKS DEPARTMENT	
		3/7/12		
DATE	REVISION	BY	STANDARD DRAWING	No.
			BACKFLOW PREVENTION ASSEMBLY DOUBLE CHECK DEVICE 2" AND SMALLER	470

NOTES:

1. SIGN MATERIAL: .063" THICK ALUMINUM (6063T-4).
2. SIGN FACE: WHITE REFLECTIVE SHEETING, 3M DIAMOND GRADE OR APPROVED EQUAL, (PER CALIFORNIA D.O.T. MAT'LS SPECIFICATIONS). WITH ANTI-GRAFFITI COATING.

   COLORS:
   - WHITE WILL BE USED FOR LETTERING AND THE PICTOGRAM BACKGROUND.
   - PURPLE (EQUAL TO SPL 71 PERMANENT VIOLET 498) WILL BE USED FOR THE GENERAL BACKGROUND.
   - BLACK WILL BE USED FOR THE PICTOGRAM OUTLINE.
   - RED WILL BE USED FOR THE "PROHIBIT" SYMBOL.
3. SIGN POST INSTALLATION SHALL BE APPROVED BY THE WATER QUALITY TECHNICIAN.
4. LOCATION OF SIGNS SHALL BE APPROVED BY THE CITY ENGINEER.

APPROVED	CITY ENGINEER	DATE	CITY OF CHINO PUBLIC WORKS DEPARTMENT	
		4/20/16		
DATE	REVISION	BY	STANDARD DRAWING	No.
			RECYCLED WATER SIGN	485 B

NOTES:

1. CORP. STOP SHALL BE INSTALLED WITH THE KEY TO THE SIDE ONLY.
2. THE SERVICE SADDLE SHALL BE I.P. THREAD AND INSTALLED ON ALL P.V.C., CAST OR DUCTILE IRON MAINS.
3. TAPS SHALL BE MADE NOT LESS THAN 24" FROM ANY OTHER TAP, COUPLING OR JOINT.
4. ALL FITTINGS SHALL BE COMPRESSION TYPE WITH SET SCREWS. NO FLARED FITTINGS WILL BE PERMITTED.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL THE METER BOX AND SERVICE CONNECTION TO BOTH SIDES OF THE METER. THE CONTRACTOR SHALL FURTHER INSTALL TRACING WIRE TO EVERY WATER SERVICE. THE CITY OF CHINO WILL FURNISH AND INSTALL THE METER AND SENSOR UNIT ONLY.
6. BOTH SERVICE AND CONSUMER LINES SHALL BE INSTALLED PRIOR TO SIDEWALK CONSTRUCTION.
7. SERVICE LINES SHALL NOT PASS BENEATH DRIVE APPROACHES.
8. WATER METERS SHALL BE LOCATED A MINIMUM OF 5' FROM THE PROPERTY LINE AND SHALL BE SET 9" BEHIND THE CURB, OR, WHERE THE SIDEWALK IS ADJACENT TO THE CURB, 9" BEHIND THE SIDEWALK.
9. A MINIMUM 1' PERIMETER AROUND THE THREE REMAINING SIDES SHALL BE KEPT CLEAR OF PAVING, PLANTER WALLS OR OTHER CONSTRUCTION.
10. NO DIRECT TAPS SHALL BE MADE TO MAINS.
11. SERVICE SADDLES SHALL BE BRONZE OR BRASS; FORD 202B FOR A.C. PIPE OR FORD S90 FOR P.V.C. IN HIGH CORROSIVE AREAS USE FORD FC202.
12. A 3" "W" SHALL BE STAMPED IN THE CURB FACE AT SERVICE LOCATIONS.
13. THE SERVICE LINE SHALL BE 2" TYPE K COPPER TUBING OR 2" CTS POLYETHYLENE TUBE. THE MINIMUM BEND RADIUS SHALL BE 12" OR GREATER.
14. STRICT ADHERENCE TO PROVISIONS FOR TESTING AND DISINFECTING WATER LINES SHALL BE FOLLOWED.
15. WHERE BRAND NAMES ARE CALLED OUT, EQUALS MAY BE USED WHEN APPROVED IN WRITING PRIOR TO CONSTRUCTION.
16. ALL ANGLE METER VALVES WITHIN A DEVELOPMENT (TRACT OR PHASE OF A TRACT) MUST BE ADJUSTED TO FINAL GRADE AND LOCATION (RELATIVE TO THE TOP OF THE ADJACENT CURB) WITHIN SEVEN CALENDAR DAYS OF THE INSTALLATION OF THE CURB.
17. ALL COMPONENTS AND MATERIALS SPECIFIED ON THIS STANDARD SHALL BE USED ON BOTH 1-1/2" AND 2" METER INSTALLATIONS.
18. MULTIPLE CONNECTIONS LESS THAN 18" APART SHALL BE STAGGERED.

APPROVED	CITY ENGINEER	DATE	CITY OF CHINO PUBLIC WORKS DEPARTMENT	
		3/7/12		
DATE	REVISION	BY	STANDARD DRAWING	No.
			STANDARD WATER SERVICE 1 1/2" OR 2" METER (NOTES)	410 B

AGENCY APPROVAL:

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	DESCRIPTION	DATE
△	ADDENDUM 2	2.11.22

KEYNOTES

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CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

IRRIGATION DETAILS

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

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PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG AT THIS ORIGINAL PLOTTED SCALE

PLANTING NOTES

1. CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES PRIOR TO START OF WORK. COSTS INCURRED DUE TO DAMAGE OF UTILITIES IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR IF VERIFICATION WAS NOT PERFORMED.

2. CONTRACTOR SHALL NOT WILLFULLY PROCEED WITH PLANTING OPERATIONS WHEN IT IS OBVIOUS THAT UNKNOWN OBSTRUCTIONS AND GRADE DIFFERENCES EXIST THAT MAY NOT HAVE BEEN KNOWN DURING DESIGN PROCESS. BRING SUCH CONDITIONS IMMEDIATELY TO ATTENTION TO OWNER FOR RESOLUTION. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR COSTS INCURRED AND REQUIRED MODIFICATIONS DUE TO LACK OF PROVIDING SUCH NOTIFICATION.

3. CONTRACTOR SHALL APPLY A CONTACT HERBICIDE WHERE WEEDS ARE PRESENT PER MANUFACTURERS SPECIFICATIONS A MINIMUM OF TEN (10) DAYS PRIOR TO COMMENCEMENT OF ANY PLANTING OR IRRIGATION WORK. WEEDS SHALL BE ALLOWED TO COMPLETELY DIE BACK, INCLUDING THE ROOTS BEFORE PROCEEDING WITH WORK. REMOVE WEEDS AND GRASSES AND PROPERLY DISPOSE OF WASTE.

4. CONTRACTOR SHALL ARRANGE FOR SOILS TESTS PER MWELO REQUIREMENT. SEE SOILS MANAGEMENT REPORT NOTE BELOW. ASSUME (1) TEST SITE PER 5,000 S.F. OF LANDSCAPE AREA FOR BIDING PURPOSES. LANDSCAPE ARCHITECT SHALL SELECT LOCATION OF TEST SITES

5. SOILS REPORT SHALL BE SUBMITTED TO LANDSCAPE ARCHITECT FOR REVIEW.

6. BID PURPOSES ONLY ASSUME THE FOLLOWING SOIL PREPARATION AND BACKFILL:
   INCORPORATE THE FOLLOWING MATERIALS INTO ALL LAWN AND PLANTER AREAS PER 1,000 S.F. - MECHANICALLY ROTOTILL MATERIALS INTO AREA AT A DEPTH OF 6". HAND TILLING IS NOT ACCEPTABLE. WATER THOROUGHLY AFTER ROTOTILLING IS COMPLETE.

   3 C.Y. NITROLIZED WOOD SHAVINGS
   15 LB. COMMERCIAL FERTILIZER 15-15-15
   50 LB. AGRICULTURE GYPSUM
   10 LBS. IRON SULFATE

   BACKFILL MIX FOR ALL TREES AND SHRUBS:

   2 PARTS NATIVE ON-SITE SOIL
   1 PART NITROLIZED WOOD SHAVINGS
   1.5 LB./C.Y. COMMERCIAL FERTILIZER 15-15-15
   5 LB. /C.Y. AGRICULTURAL GYPSUM
   1 LB./C.Y. IRON SULFATE
   PLANTING TABLETS AT RATES PER MANUF. SPEC.

   ACTUAL SOILS AMENDMENTS AND BACKFILL SHALL COMPLY WITH THE SOILS MANAGEMENT REPORT.

7. SWEEP DOWN ALL WALKS AFTER AMENDMENTS AND BACKFILL PRIOR TO WATERING TO PREVENT STAINING OF PAVING.

8. ALL CLEARANCE DATA PER LOCAL JURISDICTION'S TREE PLANTING STANDARDS AND GUIDELINES.

9. INSTALL 'DEEP ROOT' (OR APPROVED EQUAL) TREE ROOT BARRIERS ON ALL TREES WITHIN 20'-0" OF SIDEWALKS OR HARD SURFACES. CHECK MANUFACTURERS CALCULATOR CHART FOR NUMBER OF PANELS FOR EACH SIZE TREE. AVAILABLE FROM: DEEP ROOT PARTNERS, LP, 345 LORTON AVENUE, SUITE 305 BURLINGAME, CA, 94010 (800)LV-ROOTS, (415) 344-1464.

10. PROVIDE PHOTOGRAPHS OF PLANT MATERIAL FOR LANDSCAPE ARCHITECT FOR INITIAL APPROVAL.

11. NO SUBSTITUTIONS FOR PLANT MATERIAL SHALL BE MADE WITHOUT PRIOR WRITTEN APPROVAL BY THE LANDSCAPE ARCHITECT. DELIVERY SLIPS FOR PLANT MATERIAL SHALL BE SUBMITTED TO LANDSCAPE ARCHITECT FOR REVIEW.

12. LANDSCAPE ARCHITECT SHALL HAVE THE OPPORTUNITY TO INSPECT AND APPROVE ALL SPECIMEN AND BOX MATERIALS AT JOB SITE PRIOR TO PLANTING. ALL UNACCEPTABLE MATERIAL SHALL BE REMOVED FROM JOB SITE AND REPLACED WITH ACCEPTABLE MATERIAL AT CONTRACTOR'S EXPENSE.

13. PLANTS SHALL NOT BE PLACED WITHIN TWELVE (12) INCHES OF SPRINKLER HEADS.

14. LANDSCAPE ARCHITECT SHALL APPROVE FINAL PLACEMENT OF TREES AND SHRUBS PRIOR TO PLANTING. PERFORM THE FOLLOWING PROCEDURES BEFORE PLANTING PIT EXCAVATION:

    A. SHRUBS - PLACE ACTUAL PLANT CONTAINERS ON SITE IN PRELIMINARY LOCATIONS.
    B. TREES - FIELD MARK LOCATIONS WITH WOOD STAKES BEFORE DIGGING HOLES.CONTRACTOR SHALL
    C. GIVE AT LEAST THREE (3) BUSINESS DAYS NOTICE FOR PLANT LAYOUT APPROVAL.

15. PLANTING OF GROUNDCOVER SHALL BE CONTINUOUS UNDER ALL SHRUBS IN ALL PLANTER AREAS THROUGHOUT THE SITE UNLESS OTHERWISE INDICATED.

16. LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL THEFT OR DAMAGE TO PLANT MATERIAL ONCE PLANT MATERIAL IS DELIVERED TO THE JOB SITE.

17. A REPRESENTATIVE OF THE BOTANICAL NAME TAGS, FURNISHED BY THE NURSERY STOCK SUPPLIER, SHALL REMAIN ATTACHED TO THE PLANTS UNTIL FINAL INSPECTION.

18. PROVIDE SAMPLES OF DECOMPOSED GRANITE, GRAVEL, PEBBLE, OR ROCK INSTALLED PER DETAILS FOR APPROVAL BY LANDSCAPE ARCHITECT.

19. AFTER PLANTING IS COMPLETE BUT PRIOR TO INSTALLING MULCH, APPLY GRANULAR PRE-EMERGENT AT MANUFACTURER SUGGESTED RATE, RONSTAR OR SNAPSHOT OR EQUAL.

20. IN ALL SHRUB AND GROUNDCOVER AREAS APPLY 3" MIN. LAYER OF FOREST FLOOR BARK MULCH AGUINAGA GREEN, INC. OR EQUAL. CONTRACTOR SHALL SUBMIT SAMPLE TO LANDSCAPE ARCHITECT FOR APPROVAL. DO NOT INSTALL MULCH IN AREAS OF GROUNDCOVERS THAT ARE LESS THAN 3" TALL AT MATURITY.

21. ALL AREAS SHALL BE GRADED TO SLOPE TO CATCH BASINS OR FLOW LINES AS INDICATED ON THE PLANS OR AS DIRECTED BY THE LANDSCAPE ARCHITECT. SOIL SHALL BE 1 1/2" BELOW ADJACENT HEADERS AND PAVING IN GROUNDCOVER AREAS AND 1/2" IN TURF, AND AREAS OF GROUNDCOVERS THAT ARE LESS THAN 3" TALL AT MATURITY.

22. INSTALL JUTE NETTING ON SLOPES OF 2:1 OR STEEPER, UNLESS OTHERWISE INDICATED.

23. UPON COMPLETION OF ALL PLANTING OPERATIONS, THE PORTION OF THE PROJECT USED FOR THE APPARATUS OF THIS WORK SHALL BE CLEANED OF ALL DEBRIS, SUPERFLUOUS MATERIAL AND EQUIPMENT. ALL SUCH MATERIALS AND EQUIPMENT SHALL BE ENTIRELY REMOVED FROM THE PROJECT SITE. PAVING SHALL BE WASHED CLEAN AT THE COMPLETION OF WORK.

24. UPON COMPLETION OF PLANTING, THE CONTRACTOR SHALL ARRANGE FOR A SUBSTANTIAL COMPLETION INSPECTION BY LANDSCAPE ARCHITECT. CONTRACTOR SHALL CORRECT ANY DISCREPANCIES FOUND PRIOR TO FINAL INSPECTION AND ACCEPTANCE OF THE PROJECT.

25. UPON COMPLETION OF PROJECT, CONTRACTOR SHALL PROVIDE DOCUMENTATION VERIFYING IMPLEMENTATION OF RECOMMENDATIONS FROM SOILS MANAGEMENT REPORT.

26. GUARANTEE: ALL PLANT MATERIAL SHALL BE GUARANTEED FOR REPLACEMENT AFTER FINAL INSPECTION AS FOLLOWS:
    5 GAL. AND SMALLER-90 DAYS
    15 GAL. AND LARGER-ONE YEAR

27. MAINTENANCE PERIOD: CONTRACTOR SHALL MAINTAIN GUARANTEED PLANTS FOR 90 DAYS FROM SUBSTANTIAL COMPLETION AS DEEMED BY THE LANDSCAPE ARCHITECT.

28. REPLACE OR REPAIR EXISTING MATERIALS THAT ARE DAMAGED BY CONTRACTOR DURING PLANTING OPERATIONS.

29. UPON FINAL ACCEPTANCE OF THE WORK, THE CONTRACTOR SHALL SUBMIT TO THE OWNER SIGNED ORIGINALS OF ALL MATERIALS AND LABOR RELEASES.

30. PLANT QUANTITIES IN LEGEND ARE FOR REFERENCE ONLY, CONTRACTOR TO PROVIDE AND INSTALL ALL PLANT MATERIAL SHOWN ON PLANS.

SOIL MANAGEMENT REPORT NOTES

1. AFTER MASS GRADING IS COMPLETE, CONTRACTOR SHALL SUBMIT SOIL SAMPLES TO A CERTIFIED LABORATORY FOR ANALYSIS AND RECOMMENDATIONS.

2. SOIL ANALYSIS SHALL INCLUDE:

   A. SOIL TEXTURE
   B. INDICATE INFILTRATION RATE
   C. INDICATE pH
   D. TOTAL SOLUBLE SALTS
   E. SODIUM
   F. PERCENT ORGANIC MATTER
   G. RECOMMENDATIONS

3. SUBMIT ANALYSIS REPORT TO LANDSCAPE ARCHITECT FOR REVIEW OF PLANTING AND IRRIGATION PLANS.

4. CONTRACTOR SHALL PROVIDE DOCUMENTATION VERIFYING IMPLEMENTATION OF SOIL ANALYSIS REPORT RECOMMENDATION TO THE PROJECT APPLICANT TO SUBMIT TO THE LOCAL AGENCY AS PART OF THE CERTIFICATE OF COMPLETION.

PLANTING LEGEND: Trees

SYMBOL	NAME	SIZE	QTY	WATER REQ.	DETAIL
	AESCULUS CALIFORNICA CALIFORNIA BUCKEYE	24" BOX	4	LOW	C / L3.51
	BRACHYCHITON POPULNEUS KURRAJONG	48" BOX	7	LOW	C / L3.51
	JUGLANS CALIFORNICA VAR . CALIFORNICA/ SOUTHERN CALIFORNIA BLACK WALNUT	24" BOX	3	LOW	C / L3.51
	LAGERSTROEMIA 'NATCHEZ' NATCHEZ CRAPE MYRTLE	36" BOX	6	MOD	C / L3.51
	MELALEUCA QUINQUENERVIA CAJEPUT TREE	48" BOX	7	MOD	C / L3.51
	PODOCARPUS GRACILIOR FERN PINE	24" BOX	23	MOD	C / L3.51
	QUERCUS AGRIFOLIA COAST LIVE OAK	48" BOX 60" BOX	11 1	LOW	C / L3.51
	QUERCUS LOBATA VALLEY OAK	48" BOX	31	MOD	C / L3.51
	TIPUANA TIPU TIPU TREE	60" BOX	1	MOD	C / L3.51

PLANTING LEGEND: Shrubs & Vine

SYMBOL	NAME	SIZE	QTY	WATER REQ.	DETAIL
	ASPARGUS DENSIFLORUS 'MYERS' ASPARAGUS FERN	5 GAL @ 3' O.C.	193	MOD	A / L3.51
	BACCHARIS PILULARIS 'PIGEON POINT' PIGEON POINT COYOTE BRUSH	1 GAL @ 4' O.C.	467	LOW	A / L3.51
	CHONDROPETALUM TECTORUM SMALL CAPE RUSH	1 GAL @ 4' O.C.	68	MOD	A / L3.51
	DASYLIRION LONGISSIMUM MEXICAN GRASS TREE	15 GAL @ 5' O.C.	7	LOW	A / L3.51
	DENDROMECON HARFORDII ISLAND BUSH POPPY	15 GAL PER PLAN	7	LOW	A / L3.51
	DISTICTIS BUCCINATORIA RED TRUMPET VINE	5 GAL @ 12' O.C.	29	MOD	A / L3.51
	ECHIUM CANDICANS PRIDE OF MADEIRA	1 GAL @ 4' O.C.	58	LOW	A / L3.51
	ENCELIA FARINOSA BRITTLE BUSH	1 GAL @ 30" O.C.	23	VERY LOW	A / L3.51
	ERIOGONUM CINEREUM ASHY LEAF BUCKWHEAT	5 GAL @ 30" O.C.	49	LOW	A / L3.51
	ERIOGONUM FASCICULATUM CALIFORNIA BUCKWHEAT	1 GAL @ 3' O.C.	387	LOW	A / L3.51
	ERIOGONUM GIGANTEUM SAINT CHATHERINE'S LACE	5 GAL @ 48" O.C.	116	LOW	A / L3.51
	GALVEZIA SPECIOSA 'BOCAROSA' BOCAROSA ISLAND SNAPDRAGON	1 GAL @ 3' O.C.	144	LOW	A / L3.51
	LOBELIA LAXIFLORA MEXICAN LOBELIA	1 GAL @ 4' O.C.	70	LOW	A / L3.51
	LOMANDRA LONGIFOLIA BREEZE BREEZE MAT RUSH	1 GAL @ 36" O.C.	60	MOD	A / L3.51
	LOMANDRA LONGIFOLIA NYALLA NYALLA MAT RUSH	1 GAL @ 36" O.C.	54	MOD	A / L3.51
	LOMANDRA LIME TUFF LIME TUFF MAT RUSH	1 GAL @ 30" O.C.	51	MOD	A / L3.51
	RHAMNUS C. 'MOUND SAN BRUNO' MOUND SAN BRUNO COFFEEBERRY	5 GAL @ 36" O.C.	73	LOW	A / L3.51
	ROMNEYA COULTERI CALIFORNIA TREE POPPY	1 GAL @ 4' O.C.	23	VERY LOW	A / L3.51
	SALVIA 'BEE'S BLISS' BEE'S BLISS SAGE	1 GAL @ 4' O.C.	161	LOW	A / L3.51
	SALVIA 'MRS. BEARD' MRS. BEARD CREEPING SAGE	1 GAL @ 4' O.C.	137	LOW	A / L3.51
	SALVIA APIANA WHITE SAGE	1 GAL @ 36" O.C.	36	LOW	A / L3.51
	SALVIA MEXICANA 'LIMELIGHT' LIMELIGHT MEXICAN SAGE	5 GAL @ 36" O.C.	52	LOW	A / L3.51
	SALVIA MELLIFERA 'CALAMITY JANE' CALAMITY JANE BLACK SAGE	5 GAL @ 48" O.C.	76	LOW	A / L3.51
	SENNA ARTEMISIOIDES FEATHERY CASSIA	5 GAL @ 48" O.C.	26	LOW	A / L3.51

PLANTING LEGEND: Turf and Groundcover

SYMBOL	NAME	SIZE	QTY	WATER REQ.	DETAIL
	BULLSEYE BERMUDA GRASS	SOD	19,283 s.f.	HIGH	-
	ACHILLEA MILLEFOLIUM YARROW	1 GAL @ 24" O.C.	1,117 s.f.	LOW	D/ L3.51
	CAREX DIVULSA EUROPEAN GREY SEDGE	1 GAL @ 18" O.C.	4,414 s.f.	LOW	D/ L3.51
	CAREX PRAEGRACILIS CALIFORNIA FIELD SEDGE	1 GAL @ 18" O.C.	263 s.f.	LOW	D/ L3.51
	DIANELLA BLUTOPIA BLUTOPIA FLAX LILY	1 GAL @ 18" O.C.	298 s.f.	MOD	D/ L3.51
	JUNCUS PATENS CALIFORNIA GREY RUSH	1 GAL @ 2' O.C.	780 s.f.	LOW	D/ L3.51
	JUNCUS PATENS 'ELK BLUE' ELK BLUE CALIFORNIA GREY RUSH	1 GAL @ 2' O.C.	896 s.f.	LOW	D/ L3.51

PLANTING LEGEND: Gravel

SYMBOL	NAME	SIZE	NOTES	DETAIL
	CRUSHED GRAVEL, BLUESTONE	¾"	ANGULAR, NOT ROUNDED	G, H / L3.51
	CRUSHED GRAVEL, PEWTER GRAY	¾"	ANGULAR, NOT ROUNDED	G, H, I / L3.51
	BLASTED GRANITE BOULDERS TOTAL QTY: 12. SW BOULDER & STONE	4 @ 3' LONG; 4 @ 4' LONG; 4 @ 5' LONG		-

AGENCY APPROVAL:

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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

PLANTING SCHEDULE AND NOTES

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

L3.00

2/13/2020 3:47:43 PM

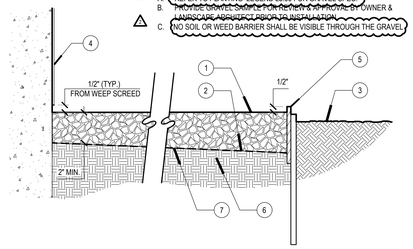
PLANTING SCHEDULE AND NOTES

PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON ALL SHEETS ORIGINAL PAPER SIZE

1. GRAVEL PAVING PER PLAN.
2. SURFACE OF COMPACTED SUB-GRADE SHALL SLOPE AWAY FROM BUILDING, SEE C3.00 GRADING PLAN
3. FINISH GRADE PER PLAN: -½" @ TURF AREAS. -1-½" @ SHRUB AREAS.
4. ADJACENT FACE OF BUILDING
5. STEEL LANDSCAPE EDGING PER PLAN. SEE REFERENCE LEGEND/L1.00 FOR MORE INFORMATION
6. SUB-GRADE PER GEOTECHNICAL REPORT
7. MIRAFI 600X FABRIC WEED BARRIER

A. REFER TO PLANTING LEGEND L3.00 FOR GRAVEL SPEC.
B. PROVIDE GRAVEL SAMPLE FOR REVIEW & APPROVAL BY OWNER & LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
C. NO SOIL OR WEED BARRIER SHALL BE VISIBLE THROUGH THE GRAVEL.

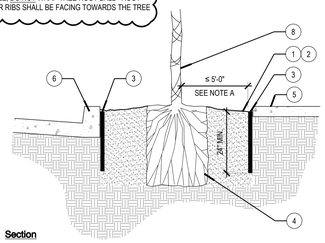


I Gravel Maintenance Strip
Scale: 1 1/2"-1'-0"

1. FINISH GRADE PER GRADING PLAN. INSTALL TREE HEIGHT ACCORDINGLY. ACCOUNT FOR SOIL TOPPING.
2. SOIL TOPPING PER PLANTING PLAN.
3. 24" MIN. HIGH ROOT CONTROL BARRIER PER PLANTING NOTES. UNLESS SPECIFIED OTHERWISE. TOP OF BARRIER SHALL ½" BELOW FINISH GRADE AND SHALL NOT BE VISIBLE.
4. TREE ROOTBALL
5. ADJACENT HARDSCAPE
6. CONCRETE CURB AND GUTTER WHERE APPLICABLE
7. MATURE DRIP LINE OF TREE AS SHOWN PER PLAN.
8. TREE TRUNK

A. NOTES:
USE ROOT BARRIERS EVERYWHERE THE EDGE OF TREE ROOTBALL IS LOCATED 5' OR LESS FROM THE EDGE OF FLATWORK, OR 20' OR LESS FROM STRUCTURES OR MAJOR UTILITIES (ELECTRIC, FIBEROPTIC, SEWER AND GAS LINES, WATER MAINLINES, AND EQUIPMENT VAULTS). POSITION ROOT BARRIER AS CLOSE TO CURB/PAVING AS POSSIBLE. DO NOT WRAP TREE ROOT BALL - ROOT BARRIER RIBS SHALL BE FACING TOWARDS THE TREE

D. LENGTH OF ROOT BARRIER SHALL BE EQUAL TO THE MATURE DRIPLINE OF THE PARTICULAR TREE TO BE PLANTED AS DEFINED BY PLANTING PLAN SYMBOL SIZE, NOT BY THE INSTALLED SIZE.
E. APPLY MASTIC SEALER TO JOINT BETWEEN CONCRETE SURFACE AND ROOT BARRIER FOR ADDED ROOT PROTECTION AND TO AVOID SOIL AND DEBRIS FROM BEING TRAPPED BETWEEN BARRIER AND CONCRETE.
F. ROOT BARRIER TO BE CONTINUOUS WHERE MULTIPLE TREES ARE ALIGNED AND MEET CRITERIA OF NOTE A.
G. INSTALL PER MANUFACTURERS RECOMMENDATIONS.
H. WHERE A ROLLED BARRIER IS APPROVED, CONTRACTOR MUST EXTEND THE BARRIER TO FLATTEN AND UNCOIL PRIOR TO INSTALLATION. CONTRACTOR MUST OVERLAP ROOT BARRIERS BY 1" MINIMUM WHERE CONTINUOUS AND NOT INTERLOCKING.



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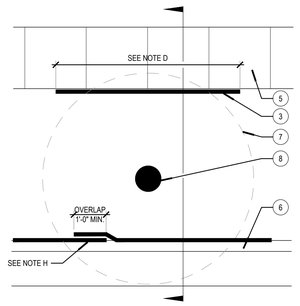
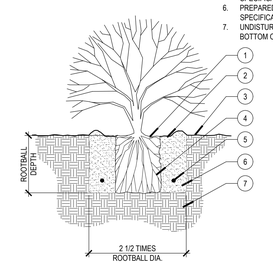


Plan View

F Linear Root Barrier
Scale: 1/2"=1'-0"

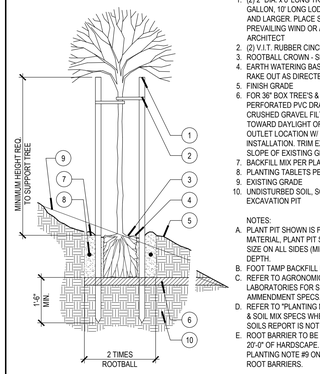
1. CROWN OF SHRUB TO BE PLANTED 1" ABOVE FINISH GRADE
2. EARTH WATERING BASIN, NO LARGER THAN ROOTBALL. RAKE OUT AS DIRECTED.
3. FINISH GRADE
4. ROOTBALL
5. FERTILIZER TABLETS, REFER TO SPECIFICATIONS
6. PREPARED BACKFILL MIX PER SPECIFICATIONS
7. UNDISTURBED SOIL. SCARIFY SIDES AND BOTTOM OF PIT



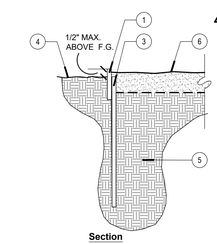
A Shrub planting
Scale: NTS

1. (2) 2" DIA. x 8' LONG TREATED LODGEPOLE STAKES FOR 5 GALLON, 10' LONG LODGEPOLE STAKES FOR 15 GALLON AND LARGER. PLACE STAKES AT RIGHT ANGLE TO PREVAILING WIND OR AS DIRECTED BY LANDSCAPE ARCHITECT
2. (2) V.I.T. RUBBER CINCH TIES, SIZE PER BOX SIZE
3. ROOTBALL CROWN - SET @ 2" ABOVE FINISH GRADE
4. EARTH WATERING BASIN, (NO LARGER THAN ROOTBALL) - RAKE OUT AS DIRECTED
5. FINISH GRADE
6. FOR 36" BOX TREE'S & LARGER, INSTALL 2" DIA. PERFORATED PVC DRAIN PIPE (SCH. 40) WRAPPED W/ CRUSHED GRAVEL FILTER SOCK @ BOTTOM OF PIT. SLOPE TOWARD DAYLIGHT OF NEAREST SLOPE AREA & CONFIRM OUTLET LOCATION W/ LANDSCAPE ARCH. PRIOR TO INSTALLATION. TRIM EXPOSED END OF PIPE TO MATCH SLOPE OF EXISTING GRADE.
7. BACKFILL MIX PER PLANTING SPECIFICATIONS
8. PLANTING TABLETS PER PLANTING SPECIFICATIONS
9. EXISTING GRADE
10. UNDISTURBED SOIL, SCARIFY SIDES & BOTTOM OF TREE EXCAVATION PIT

NOTES:
A. PLANT PIT SHOWN IS FOR 15 GALLON SIZE - FOR LARGER MATERIAL, PLANT PIT SHALL BE 18" LARGER THAN BOX SIZE ON ALL SIDES (MINIMUM) AND NO DEEPER THAN BOX DEPTH.
B. FOOT TAMP BACKFILL LIGHTLY IN 6"-10" LIFTS
C. REFER TO AGRONOMIC SOILS REPORT FROM WALLACE LABORATORIES FOR SITE SPECIFIC BACKFILL MIX & SOIL AMMENDMENT SPECS.
D. REFER TO "PLANTING NOTES" ON L3.00 FOR ALL PLANTING & SOIL MIX SPECS WHERE A SITE-SPECIFIC AGRONOMIC SOILS REPORT IS NOT PROVIDED.
E. ROOT BARRIER TO BE INSTALLED FOR ALL TREES WITHIN 20'-0" OF HARDSCAPE. SEE DETAIL F, THIS SHEET, AND PLANTING NOTE #9 ON L3.00 FOR MORE INFORMATION ON ROOT BARRIERS.



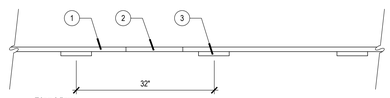
B Slope Tree Planting and Staking with Drainage
Scale: 1/2"=1'-0"



1. STEEL HEADER. SEE REFERENCE LEGEND/L1.00 FOR MORE INFORMATION
2. FINISH GRADE
3. STEEL STAKE
4. FINISH GRADE
5. SUBGRADE AND SUBBASE PER GEOTECH REPORT
6. DECOMPOSED GRANITE OR GRAVEL PER PLAN

NOTES:
A. HEADER AND STAKES TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS

Section

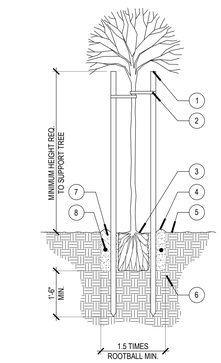


Plan View

G Steel Header
Scale: 1 1/2"-1'-0"

1. (2) 3" DIAMETER X 8' LONG LODGEPOLE TREE STAKE. PLACE STAKES AT RIGHT ANGLE TO PREVAILING WIND OR AS DIRECTED BY LANDSCAPE ARCHITECT.
2. (2) RUBBER V.I.T. CINCH-TIES, SIZE PER BOX SIZE.
3. ROOTBALL CROWN 2" ABOVE FINISH GRADE.
4. EARTH WATERING BASIN, NO LARGER THAN ROOTBALL. RAKE OUT AS DIRECTED.
5. FINISH GRADE.
6. UNDISTURBED SOIL. SCARIFY SIDES AND BOTTOM OF PIT.
7. BACKFILL MIX PER PLANTING SPECIFICATIONS. PLANTING TABLETS PER PLANTING SPECIFICATIONS.

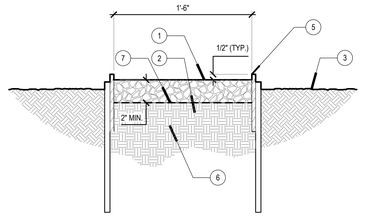
NOTES:
A. FOOT TAMP BACKFILL LIGHTLY IN 6"-10" LIFTS.
B. MAINTAIN A MIN. 1'-0" RADIUS CLEAR EARTH AREA AROUND TRUNK IN TURF.
C. ROOT BARRIER TO BE INSTALLED FOR ALL TREES WITHIN 20'-0" OF HARDSCAPE. SEE DETAIL F, THIS SHEET, AND PLANTING NOTE #9 ON L3.00 FOR MORE INFORMATION ON ROOT BARRIERS.



C Tree Planting and Staking
Scale: 1/2"=1'-0"

1. GRAVEL PAVING PER PLAN
2. SURFACE OF SUBGRADE SHALL SLOPE AWAY FROM BUILDING. DRAIN LOCATIONS PER CIVIL.
3. FINISH GRADE PER PLAN:
   -½" BELOW F.S. FOR TURF AREAS
   -1-½" BELOW F.S. FOR SHRUB AREAS
4. ADJACENT FACE OF BUILDING
5. STEEL LANDSCAPE EDGING PER PLAN. REFER TO REFERENCE LEGEND/L1.00 FOR MORE INFORMATION
6. SUB-GRADE PER GEOTECHNICAL REPORT
7. MIRAFI 600X FABRIC WEED BARRIER

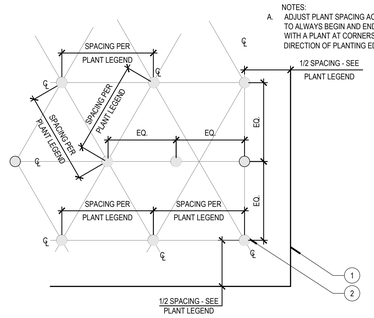
NOTES:
A. REFER TO PLANTING LEGEND FOR GRAVEL SPEC.
B. PROVIDE GRAVEL SAMPLE FOR REVIEW & APPROVAL BY OWNER & LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
C. NO SOIL OR WEED BARRIER SHALL BE VISIBLE THROUGH THE GRAVEL.



H Gravel Strip between Planting Rows
Scale: 1 1/2"-1'-0"

1. PLANTING EDGE (i.e., EDGE OF CURB OR PAVING, FACE OF WALL, ETC
2. CENTER OF PLANT ROOTBALL

NOTES:
A. ADJUST PLANT SPACING ACCORDINGLY TO ALWAYS BEGIN AND END SPACING WITH A PLANT AT CORNERS/CHANGES IN DIRECTION OF PLANTING EDGE.



D Triangular Plant Spacing
Scale: 1/2"=1'-0"

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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.22

KEYNOTES

NOTES

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

PLANTING DETAILS

ADDENDUM #2

FILE NO.: 36-C1 | A# : 04-119722

DATE: 06.17.2021 | CLIENT PROJ NO:

SHEET:

L3.51

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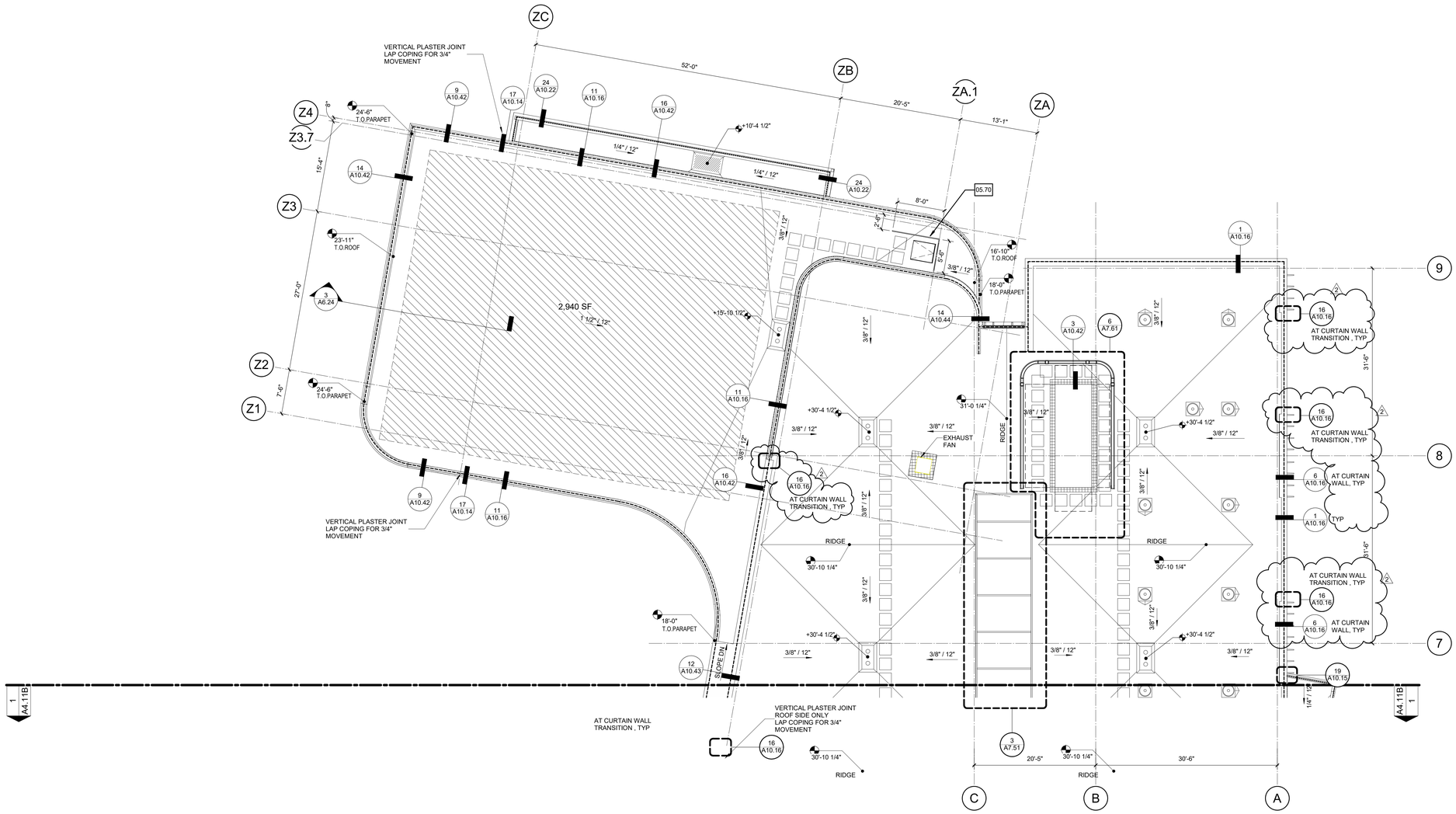

ROOF PLAN - SEGMENT A

1 1/8" = 1'-0"

PN

PLEASE RECYCLE

2/10/2022 10:25:52 AM

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LICENSED ARCHITECT KENNETH SALYER NO. C-19082 REN. 11-30-22 STATE OF CALIFORNIA

ISSUE

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2	ADDENDUM #2	2.11.2022

KEYNOTES

05.70 METAL GUARD RAIL AT ROOF HATCH | 13A10.41

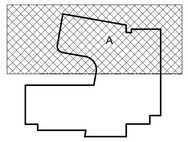
LEGENDS

- WALK PADS
- ROOF ACCESS HATCH - 21 / A10.41
- TUBULAR SKYLIGHTS - 21 / A10.44, 23 / A10.44
- DIRECTION OF ROOF SLOPE 1/4" PER FT MIN.
- ROOF AND OVERFLOW DRAIN - 12 / A10.41
- DESIGNATED FUTURE PV AREA (INSTALLATION OF FUTURE PV PANELS WILL BE UNDER SEPARATE DSA APPLICATION)
- FLAT STRIP BIRD DETERRANT SYSTEM, TWO ROWS - 8 / A10.41
- FLAT STRIP BIRD DETERRANT GEL - 9 / A10.41

NOTES

1. FOR ROOF ASSEMBLY, FLASHING, CURB, PENETRATIONS, EQUIPMENT PLATFORM DETAILS, ETC, REFER TO A10.41, A10.42, A10.43, A10.44
2. ALL ROOF FLASHING TO BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS AND RECOMMENDATIONS
3. PARAPET WALL FRAMING TO BE WALL TYPE, AS6A, UNO.

KEY PLAN:



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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ROOF PLAN - SEGMENT A

ADDENDUM #2

FILE NO.: **36-C1** A# : **04-119722**

DATE: **08.05.2021** CLIENT PROJ NO:

SHEET:

A4.11A

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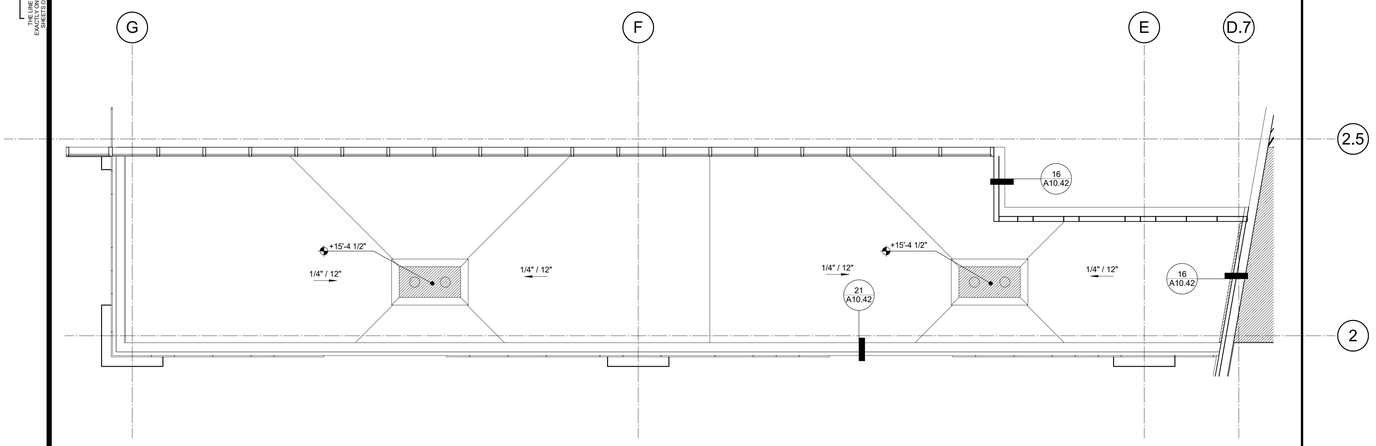
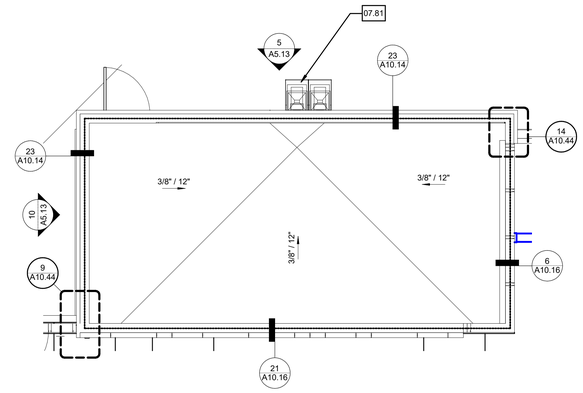
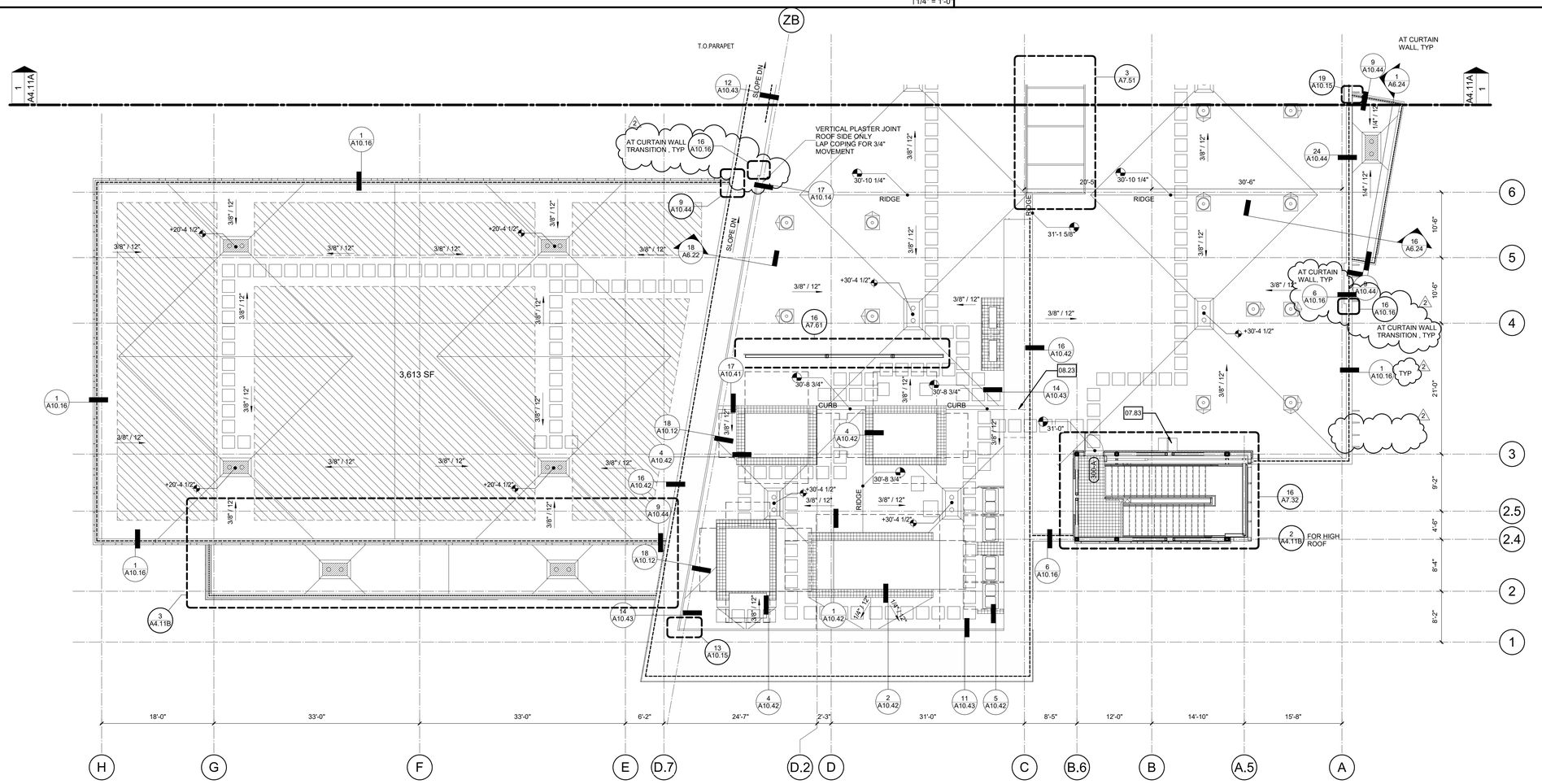


LOWER ROOF AT SUCCESS CENTER | 3
1/4" = 1'-0"



ROOF PLAN - PARTIAL - SOUTH STAIR | 2
1/4" = 1'-0"



ROOF PLAN - SEGMENT B | 1
1/8" = 1'-0"

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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

07.81	DOWNSPOUT | 5/A10.43
07.83	SPLASH PAN AT DOWNSPOUT | 6/A10.43
08.23	WALL OPENING | SEE BUILDING SECTIONS

LEGENDS

- WALK PADS
- ROOF ACCESS HATCH - 21 / A10.41
- TUBULAR SKYLIGHTS - 21 / A10.44, 23 / A10.44
- DIRECTION OF ROOF SLOPE 1/4" PER FT MIN.
- ROOF AND OVERFLOW DRAIN - 12 / A10.41
- DESIGNATED FUTURE PV AREA (INSTALLATION OF FUTURE PV PANELS WILL BE UNDER SEPARATE DSA APPLICATION)
- FLAT STRIP BIRD DETERRANT SYSTEM, TWO ROWS - 8 / A10.41
- FLAT STRIP BIRD DETERRANT GEL - 9 / A10.41

NOTES

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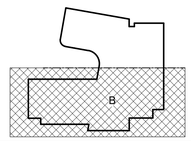
2. ALL ROOF FLASHING TO BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS AND RECOMMENDATIONS
3. PARAPET WALL FRAMING TO BE WALL TYPE, AS6A, UNO.

KEY PLAN:



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CHINO, CA 91710

PROJECT:

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SHEET NAME:

ROOF PLAN - SEGMENT B

ADDENDUM #2

FILE NO.: **36-C1** | A# : **04-119722**

DATE: **08.05.2021** | CLIENT PROJ NO:

SHEET:

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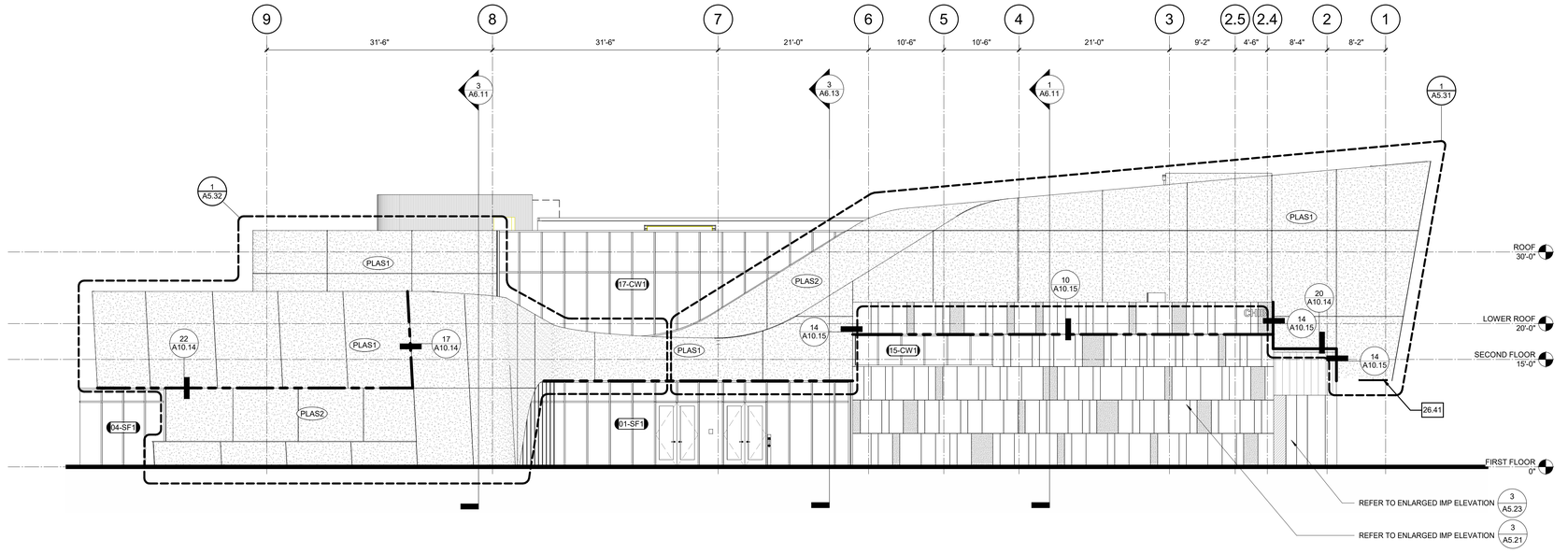
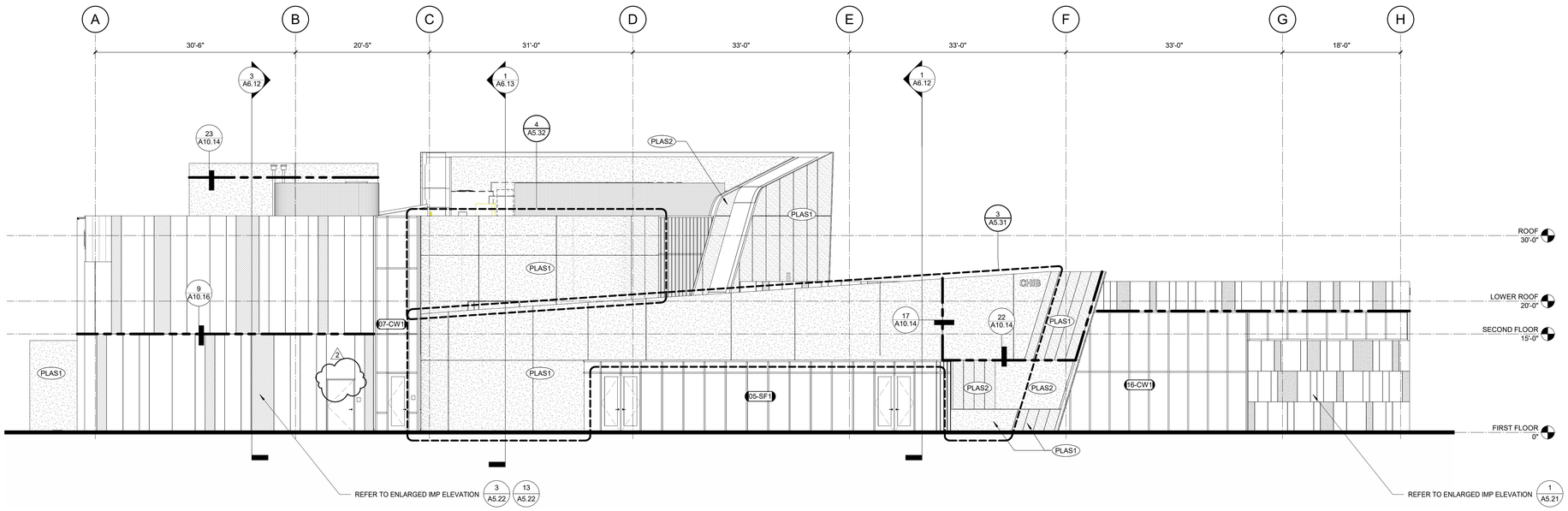


ELEVATION - EXTERIOR - WEST

3 1/8" = 1'-0"



ELEVATION - EXTERIOR - NORTH

1 1/8" = 1'-0"

2/8/2022 7:42:24 PM

PLEASE RECYCLE

AGENCY APPROVAL:

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LICENSED ARCHITECT KENNETH SALTER NO. C-19082 REN. 11-30-22 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

26.41 LIGHT FIXTURE | ELECTRICAL

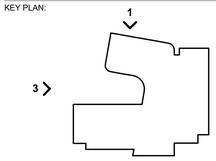
LEGENDS

- INSULATED METAL PANEL REFER - 1 / A10.15 TO TYP. ASSEMBLY DETAIL
- INSULATED METAL PANEL - 1 / A10.15 REFER TO TYP. ASSEMBLY DETAIL
- INSULATED METAL PANELL - 1 / A10.15 REFER TO TYP. ASSEMBLY DETAIL
- EXTERIOR PLASTER - 1 / A10.14 REFER TO TYP ASSEMBLY DETAIL
- PLASTER CONTROL JOINTS - 2 / A10.14
- DRIFT JOINT - REFER TO STRUCTURAL FOR ADDITIONAL INFORMATION
- EP1 — MATERIAL FINISH TAG - REFER TO MATERIAL FINISH SCHEDULE AND SPECIFICATIONS

NOTES

1. REFER TO SHEET G0.11 FOR TYPICAL SYMBOLS AND ABBREVIATIONS
2. REFER TO SHEET A5.21, A5.22, A5.23 FOR ADDITIONAL INFORMATION ON INSULATED METAL PANEL SIZES & COLORS.
3. REFER TO STRUCTURAL EXTERIOR STUD ELEVATIONS FOR LOCATION OF DRIFT JOINT AND VERTICAL JOINT WHERE OCCURS.

KEY PLAN:



FACILITY:

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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

EXTERIOR ELEVATIONS

ADDENDUM #2

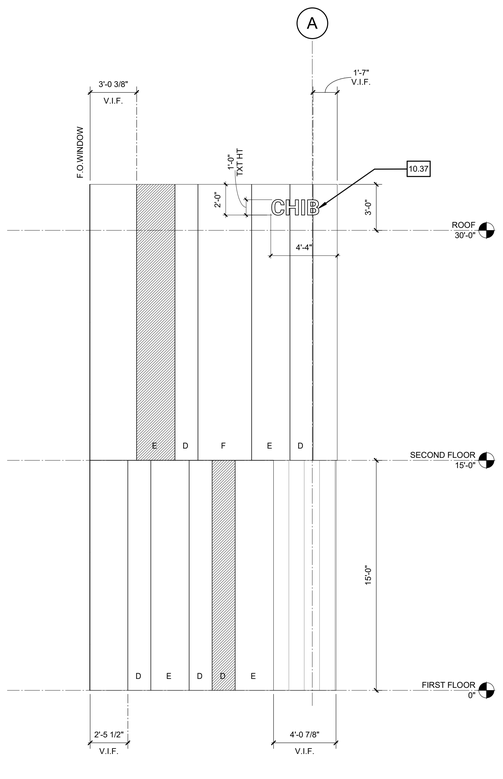
FILE NO.: 36-C1 | A# : 04-119722

DATE: 08.05.2021 | CLIENT PROJ NO:

SHEET:

A5.11

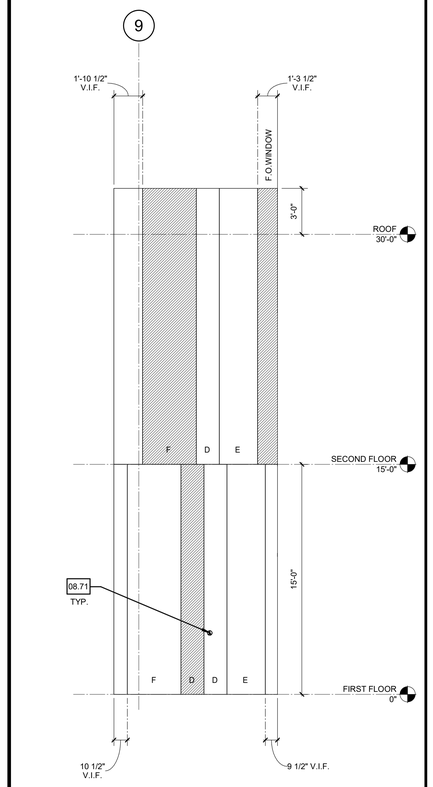
THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL SIZE (D)



INSULATED METAL PANELS - PARTIAL ELEVATION - SOUTH

18

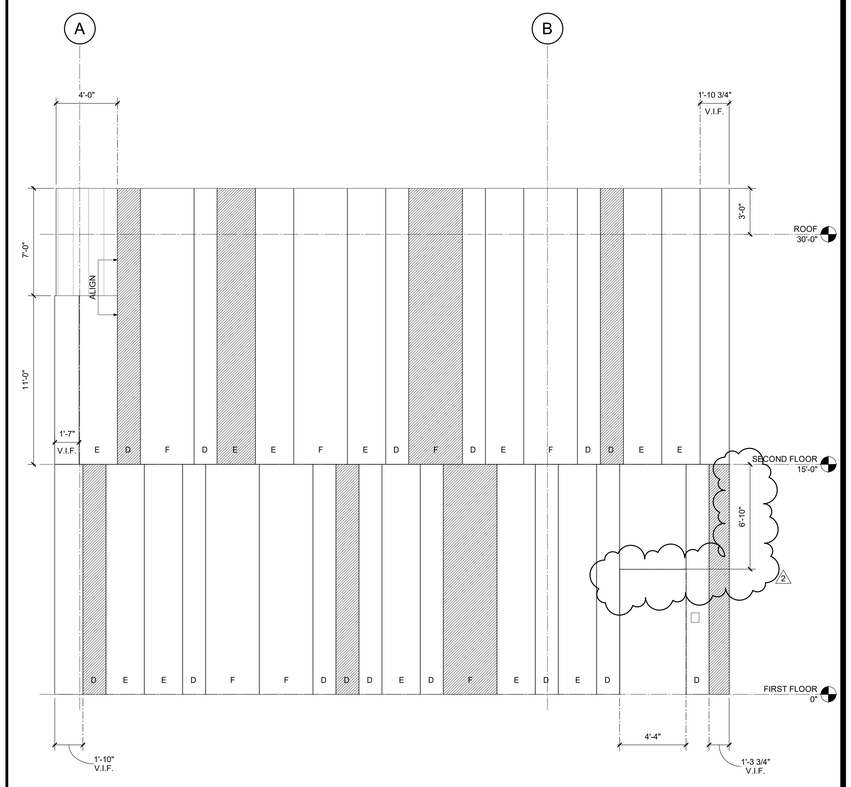
1/4" = 1'-0"



INSULATED METAL PANELS - PARTIAL ELEVATION - WEST

13

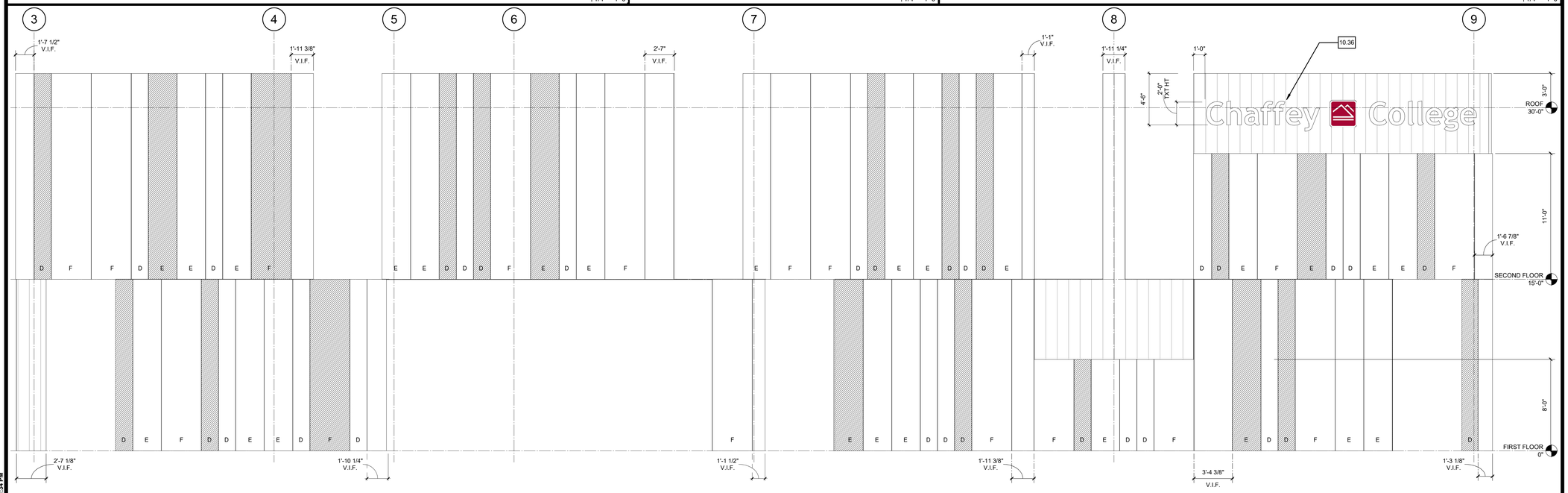
1/4" = 1'-0"



INSULATED METAL PANELS - PARTIAL ELEVATION - NORTH

3

1/4" = 1'-0"



INSULATED METAL PANELS - PARTIAL ELEVATION - EAST

1

1/4" = 1'-0"

PLEASE RECYCLE

2/9/2022 7:41:34 PM

AGENCY APPROVAL:

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LICENSED ARCHITECT
KENNETH SALYER
NO. C-19082
REN. 11-30-23
STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

08.71	ADA PUSH PLATE | HARDWARE SCHEDULE
10.36	INDIVIDUAL CAST ALUMINUM SIGN - EXTERIOR | 14/A10.81
10.37	INDIVIDUAL FLAT CUT ALUMINUM SIGN - EXTERIOR | 15/A10.81

LEGENDS

PANEL TYPES

IMP1 IMP2 IMP3 IMP4 IMP5 IMP6 IMP7

HORIZONTAL SPACING, U.N.O.

A = 1' - 0" WIDE
B = 2' - 0" WIDE
C = 3' - 0" WIDE
D = 1' - 6" WIDE
E = 2' - 6" WIDE
F = 3' - 6" WIDE

IMP4: 1' - 0" WIDE, TYPICAL

NOTES

1. REFER TO SHEET G0.11 FOR TYPICAL SYMBOLS AND ABBREVIATIONS
2. CONTRACTOR TO VERIFY INSULATED METAL PANEL SIZES AT END AND CORNER CONDITIONS
3. REFER TO STRUCTURAL EXTERIOR STUD ELEVATIONS FOR LOCATION OF DRIFT JOINT AND VERTICAL JOINT WHERE OCCURS.

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

EXTERIOR INSULATED METAL PANEL ELEVATIONS

ADDENDUM #2

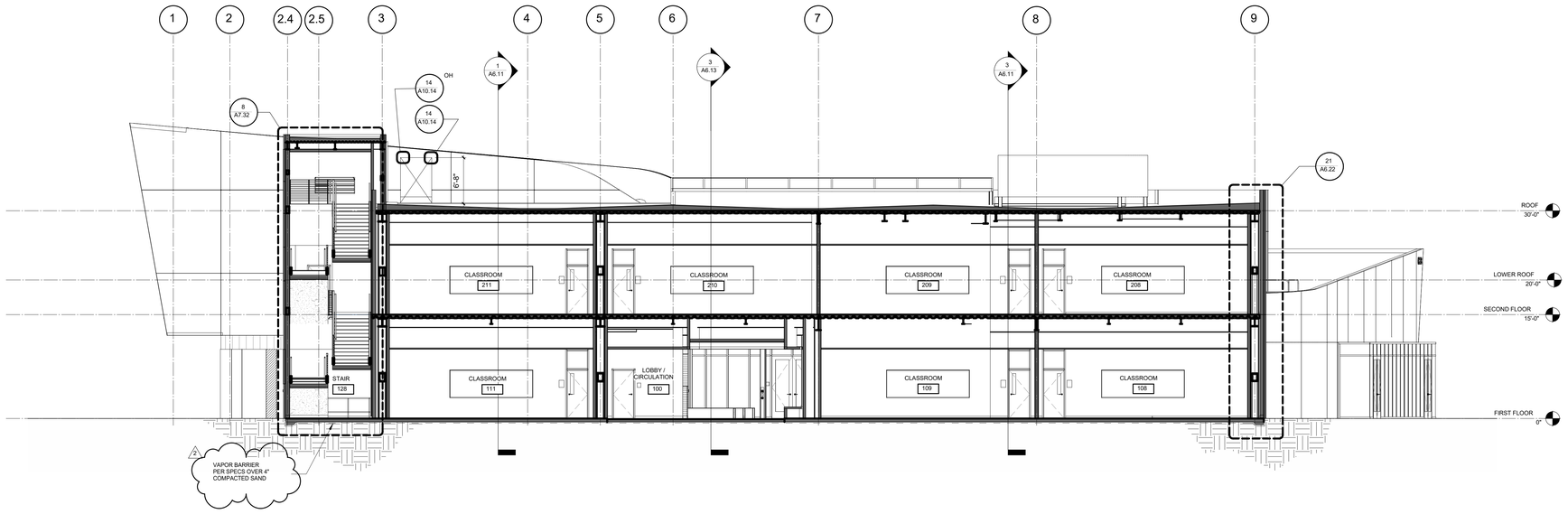
FILE NO.: **36-C1** A# : **04-119722**

DATE: **08.05.2021** CLIENT PROJ NO:

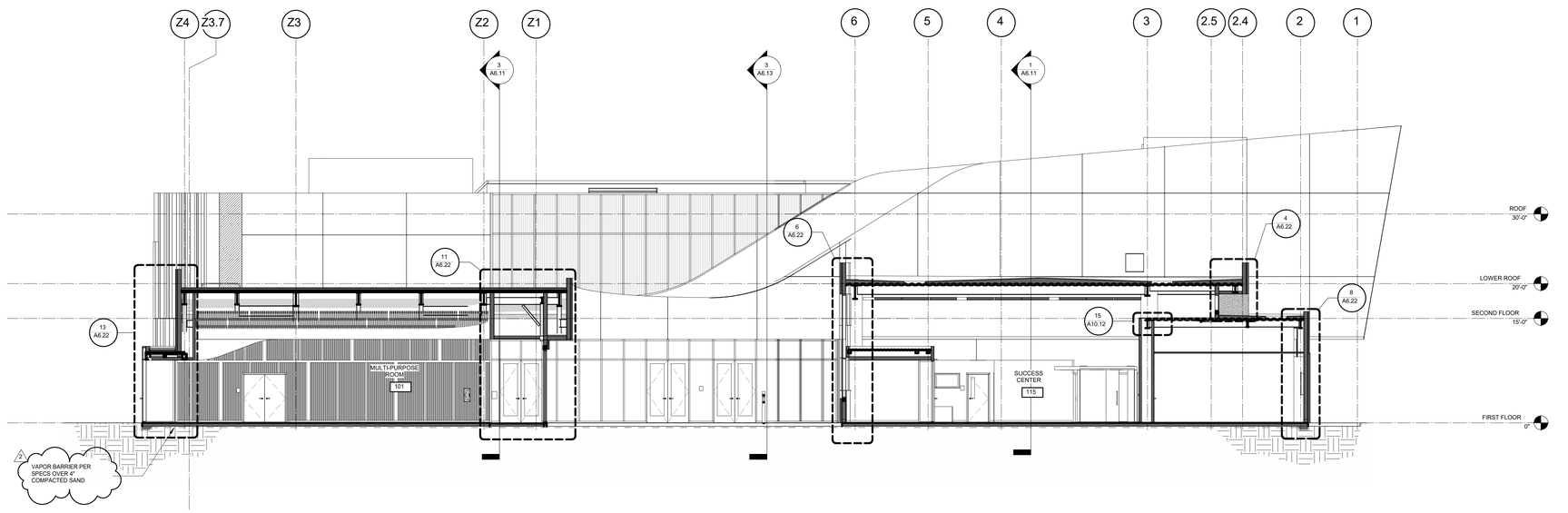
SHEET:

A5.22

EXISTING CONDITIONS SHOWN ARE BASED ON AS-BUILT DRAWINGS AND SITE OBSERVATIONS. ACTUAL CONDITIONS MAY VARY.



BUILDING SECTION 3 — 1/8" = 1'-0"



BUILDING SECTION 1 — 1/8" = 1'-0"

2/9/2022 1:59:10 PM

PLEASE RECYCLE

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LICENSED ARCHITECT KENNETH SALYER NO. C-19082 REN. 11-30-22 STATE OF CALIFORNIA

ISSUE

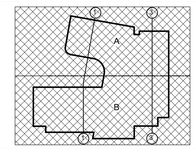
Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

LEGENDS

NOTES

KEY PLAN:



FACILITY:

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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

BUILDING SECTIONS

ADDENDUM #2

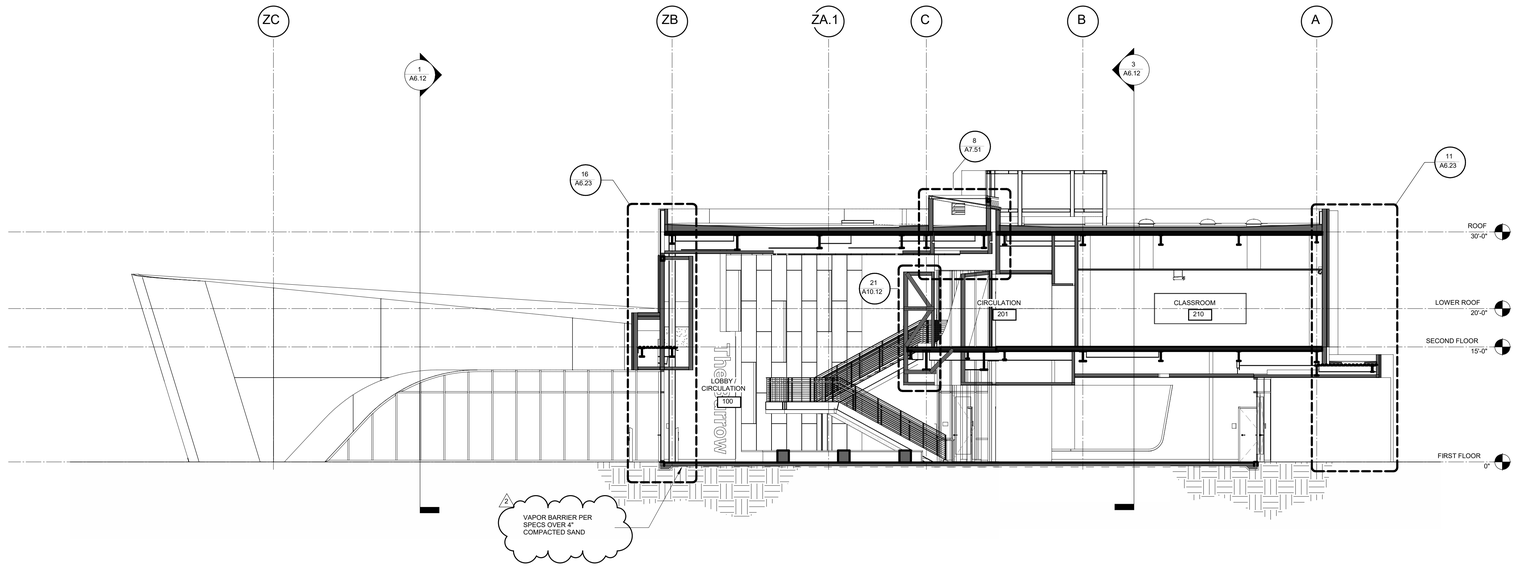
FILE NO.: 36-C1 | **A# : 04-119722**

DATE: **08.05.2021** | CLIENT PROJ NO:

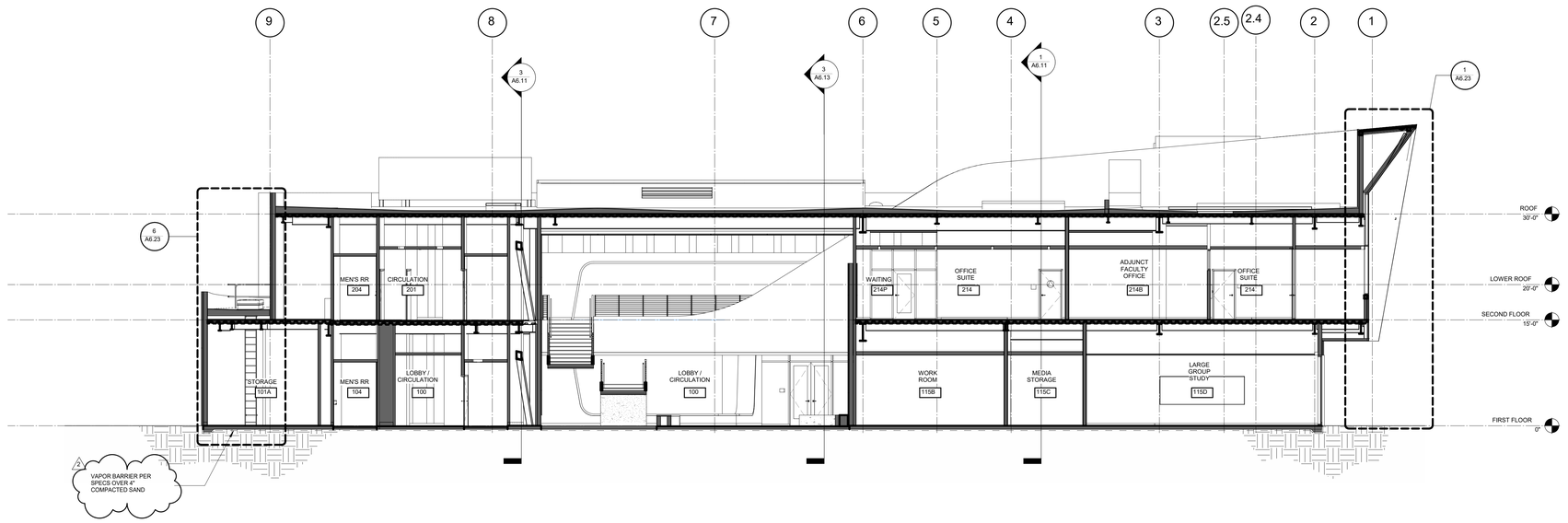
SHEET:

A6.12

DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY. CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB. ANY DISCREPANCIES SHALL BE REPORTED TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.



BUILDING SECTION — **3** — 1/8" = 1'-0"



BUILDING SECTION — **1** — 1/8" = 1'-0"

2/9/2022 1:58:33 PM

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LICENSED ARCHITECT — KENNETH SALYER — NO. C-19082 — REN. 11-30-22 — STATE OF CALIFORNIA

ISSUE

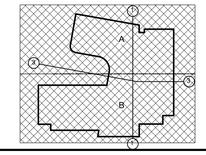
Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

LEGENDS

NOTES

KEY PLAN:



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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

BUILDING SECTIONS

ADDENDUM #2

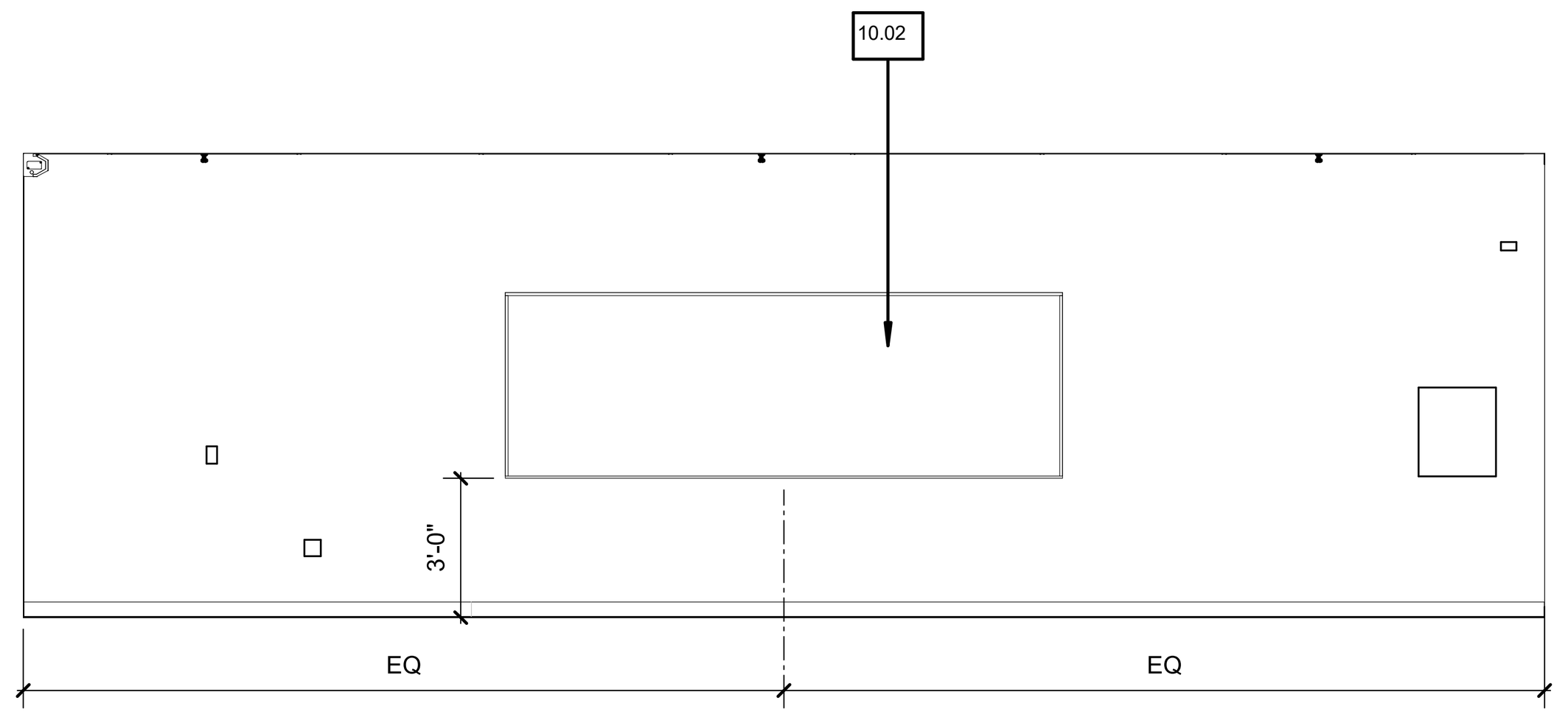
FILE NO.: **36-C1** — A# : **04-119722**

DATE: **08.05.2021** — CLIENT PROJ NO:

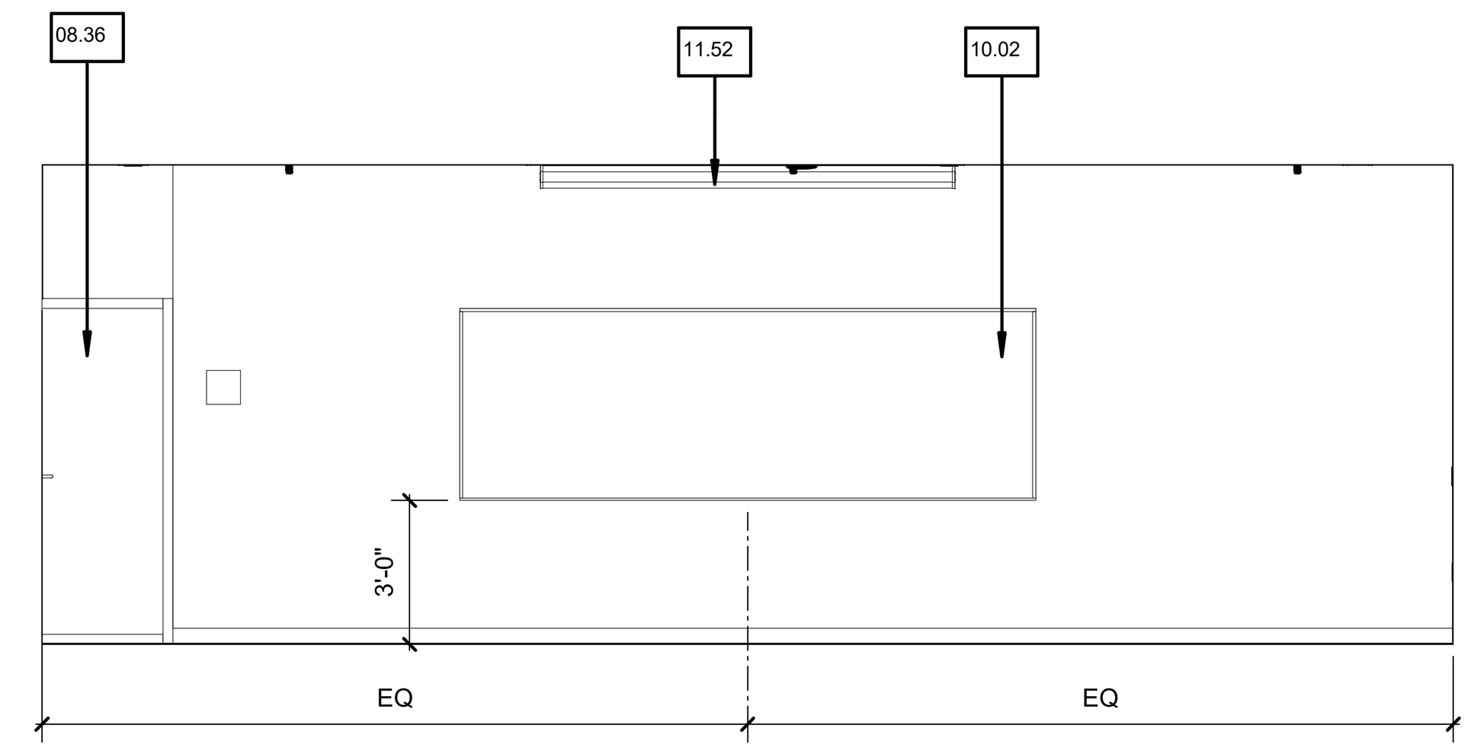
SHEET:

A6.13

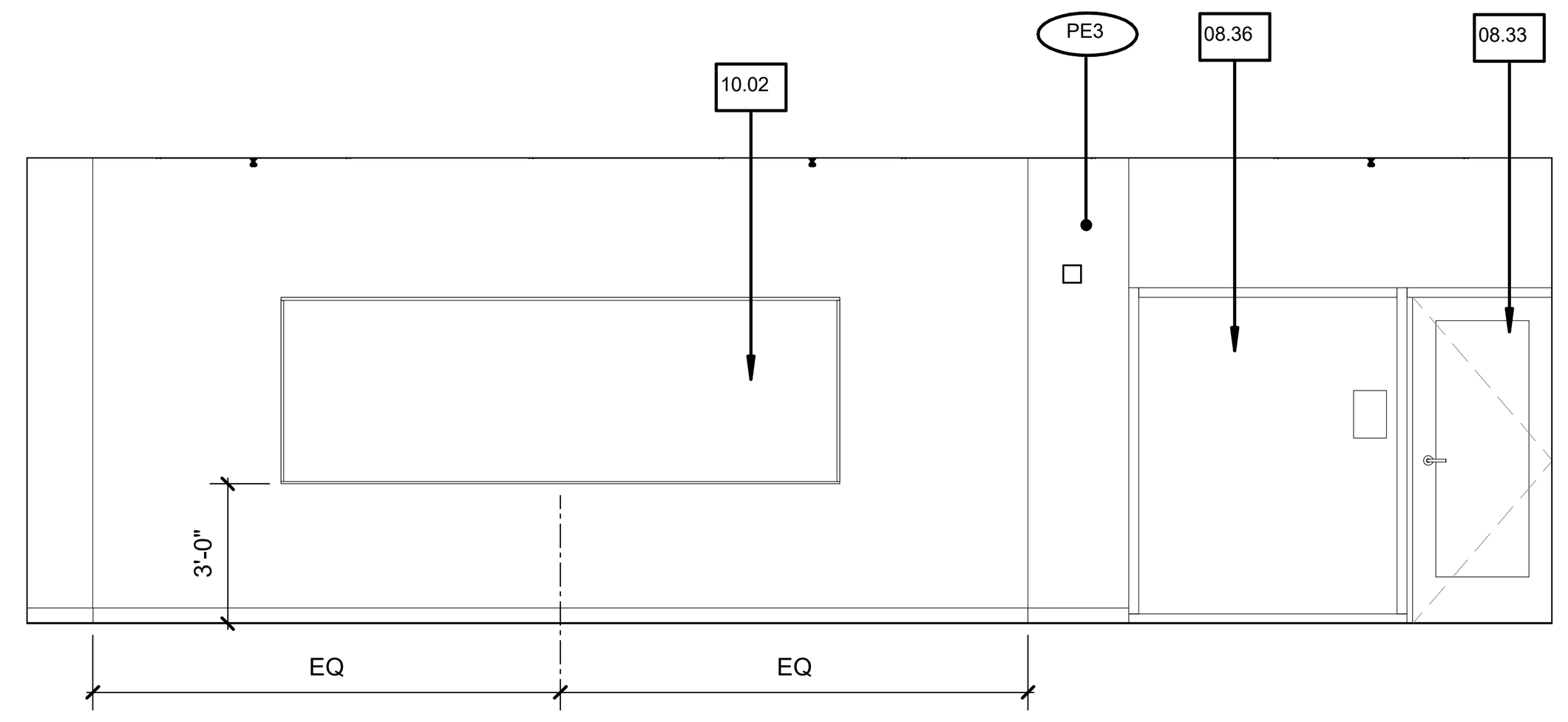
PLEASE RECYCLE



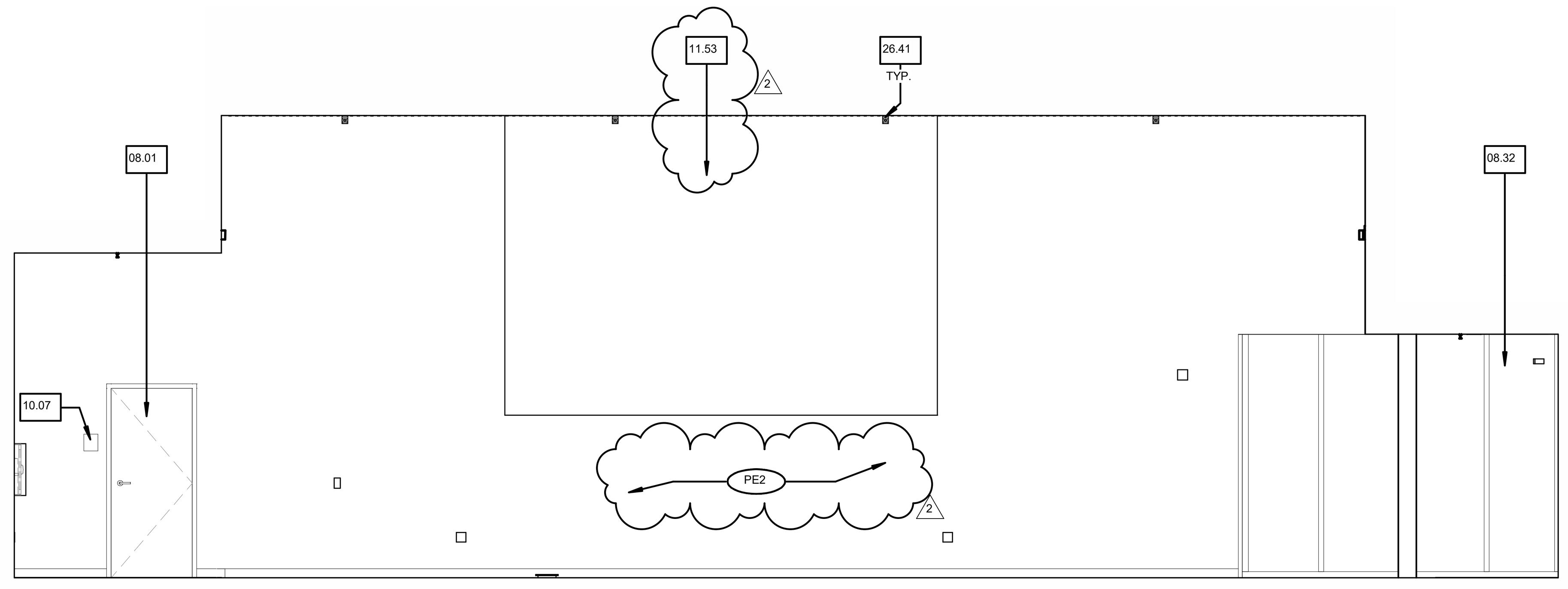
ROOM 115D - LARGE GROUP STUDY - EAST ELEVATION | **19** | 1/4" = 1'-0"



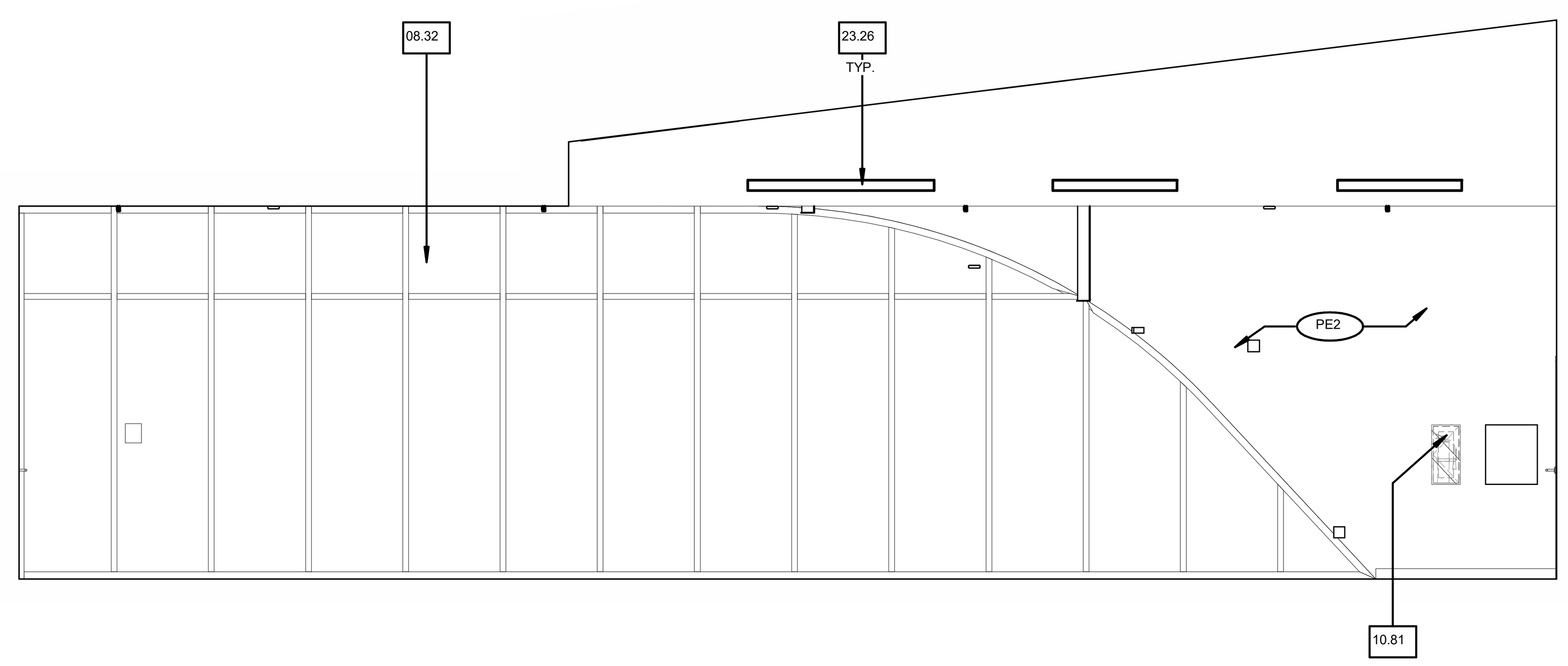
ROOM 115D - LARGE GROUP STUDY - NORTH ELEVATION | **10** | 1/4" = 1'-0"



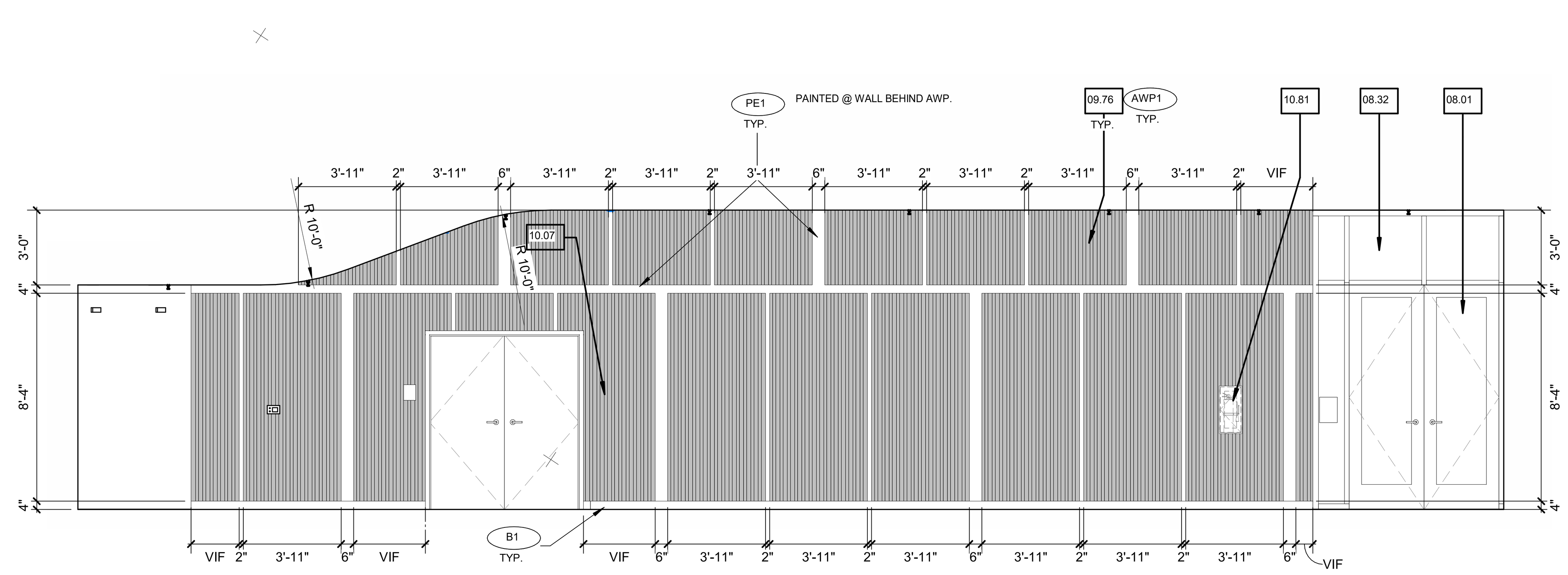
ROOM 115D - LARGE GROUP STUDY - WEST ELEVATION | **5** | 1/4" = 1'-0"



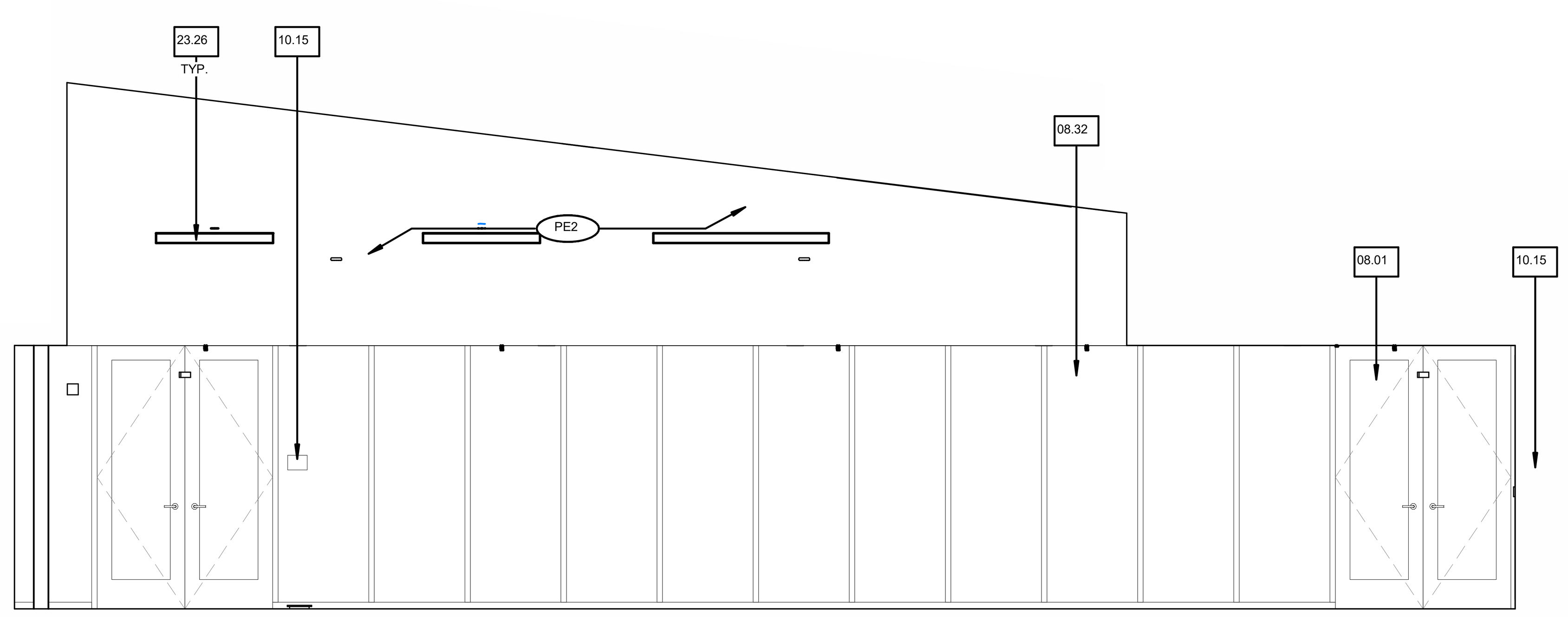
ROOM 101 - MULTI-PURPOSE ROOM - WEST | **13** | 1/4" = 1'-0"



ROOM 101 - MULTI-PURPOSE ROOM - SOUTH | **3** | 1/4" = 1'-0"



ROOM 101 - MULTI-PURPOSE ROOM - EAST | **11** | 1/4" = 1'-0"



ROOM 101 - MULTI-PURPOSE ROOM - NORTH | **1** | 1/4" = 1'-0"

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LICENSED ARCHITECT KENNETH SALYER NO. C-19082 REN. 11-30-23 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

08.01	DOOR | DOOR SCHEDULE
08.32	EXT STOREFRONT/ CURTAINWALL | WINDOW SCHEDULE
08.33	ALUMINUM DOOR | DOOR SCHEDULE
08.36	DEMOUNTABLE PARTITION | WINDOW SCHEDULE
09.76	ACOUSTICAL WALL PANEL
10.02	WHITE BOARD | 3/A10.91
10.07	ROOM ID SIGN - SINGLE INSERT | 15/A10.82
10.15	TACTILE "EXIT" SIGN | 1B/A10.82
10.81	RECESSED FIRE EXTINGUISHER CABINET | 1/A10.91
11.52	PROJECTION SCREEN (OFOI) | 23/A10.32 | REFER TO AV
11.53	PROJECTION SCREEN (CFCI) | 23/A10.32 | REFER TO AV
23.26	MECHANICAL REGISTERS | MECHANICAL
26.41	LIGHT FIXTURE | ELECTRICAL

NOTES

1. LIGHT FIXTURES, AIR TERMINALS, GRILLES, ELECTRICAL FIXTURES, OUTLETS, DATA RECEPTACLES, AUDIO/VIDEO CONNECTIONS AND MEDICAL GAS FIXTURES SHOWN ARE FOR ARCHITECTURAL COORDINATION AND DIMENSIONAL CONTROL ONLY. REF: MECHANICAL, ELECTRICAL, AND PLUMBING DRAWINGS AND SPECIFICATIONS.
2. NOT ALL FIXTURES MAY BE SHOWN ON ARCHITECTURAL ELEVATIONS
3. REFER TO SHEET G0.11 FOR TYPICAL SYMBOLS AND ABBREVIATIONS
4. REFER TO SHEET A9.31 FOR FINISH ABBREVIATIONS & DETAILS.
5. MECHANICAL REGISTERS IN WALLS PAINTED OTHER THAN PE1, SHALL BE FACTORY FINISHED TO MATCH ADJACENT WALL COLOR

FACILITY:
CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
INTERIOR ELEVATIONS - FIRST FLOOR

ADDENDUM #2

FILE NO.: 36-C1 | A#: 04-119722

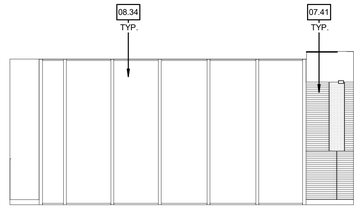
DATE: 08.05.2021 | CLIENT PROJ NO:

SHEET:
A8.11

2/8/2022 1:14:58 PM

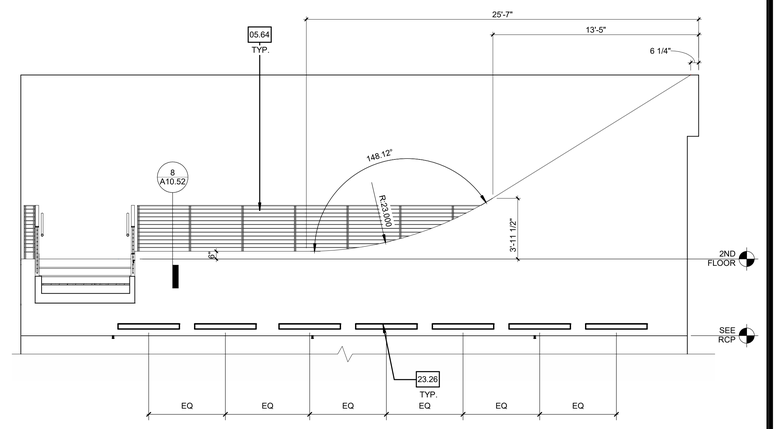
PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL SPACE SIZE

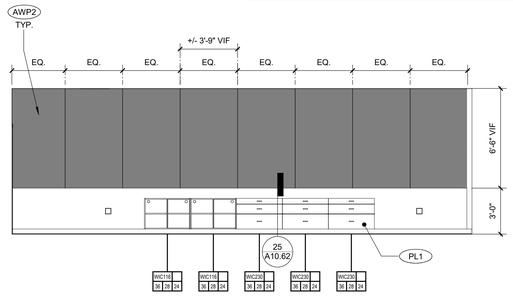


SEE 17 / A8.31 FOR ADDITIONAL INSULATED METAL PANEL INFORMATION.

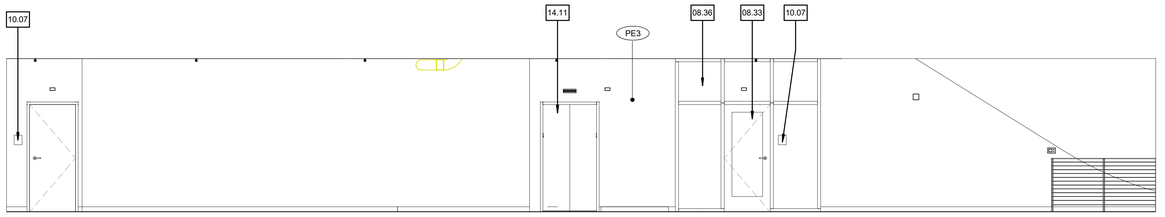
ROOM 214N - LARGE CONFERENCE ROOM - NORTH ELEVATION | 19
1/4" = 1'-0"



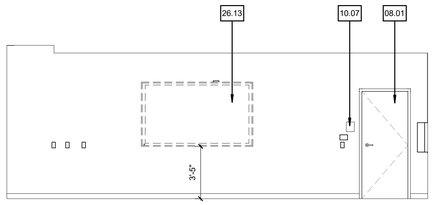
ROOM 100 - LOBBY/CIRCULATION - EAST ELEVATION @ SECOND FLOOR | 4
1/4" = 1'-0"



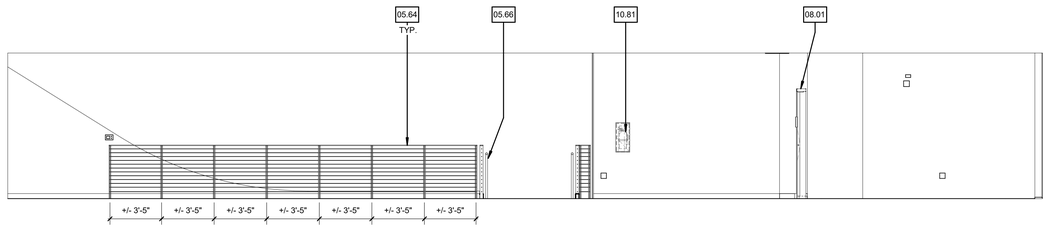
ROOM 214N - LARGE CONFERENCE ROOM - WEST ELEVATION | 18
1/4" = 1'-0"



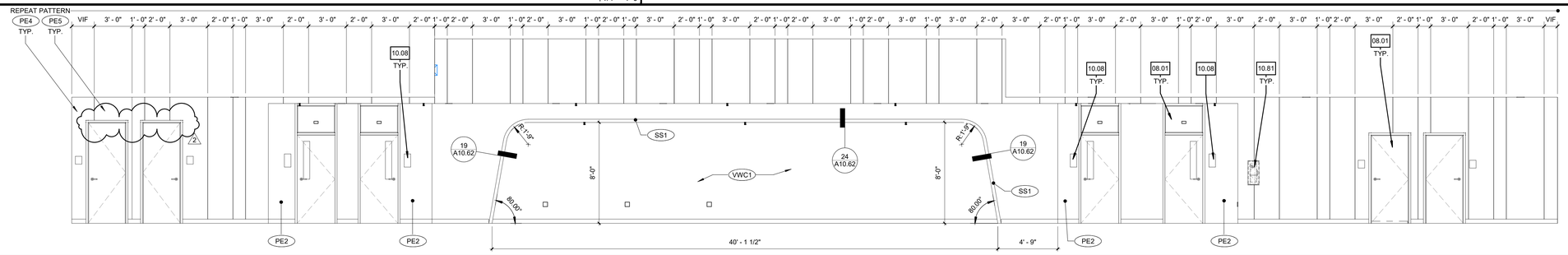
ROOM 201 - CIRCULATION - WEST ELEVATION B | 3
1/4" = 1'-0"



ROOM 214N - LARGE CONFERENCE ROOM - SOUTH ELEVATION | 17
1/4" = 1'-0"



ROOM 201 - CIRCULATION - WEST ELEVATION A | 2
1/4" = 1'-0"



ROOM 201 - CIRCULATION - EAST ELEVATION | 1
NTS

2/10/2022 9:48:21 AM

PLEASE RECYCLE

AGENCY APPROVAL:

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LICENSED ARCHITECT
KENNETH SALYER
NO. C-19082
REN. 11-30-22
STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

05.64	METAL GUARD
05.66	METAL HANDRAIL
07.41	INSULATED METAL WALL PANELS | 1/A10.15, 3/A10.15
08.01	DOOR | DOOR SCHEDULE
08.33	ALUMINUM DOOR | DOOR SCHEDULE
08.34	GLAZED ALUMINUM CURTAIN WALL
08.36	DEMOUNTABLE PARTITION | WINDOW SCHEDULE
10.07	ROOM ID SIGN - SINGLE INSERT | 15/A10.82
10.08	ROOM ID SIGN - DOUBLE INSERT | 14/A10.82
10.81	RECESSED FIRE EXTINGUISHER CABINET | 1/A10.91
14.11	ELEVATOR ENTRANCE
23.26	MECHANICAL REGISTERS | MECHANICAL
26.13	INSTALL BACKING PER DETAIL 1/XS0.61 FOR TV (OFOI) | ELECTRICAL

NOTES

1. LIGHT FIXTURES, AIR TERMINALS, GRILLES, ELECTRICAL FIXTURES, OUTLETS, DATA RECEPTACLES, AUDIO/VIDEO CONNECTIONS AND MEDICAL GAS FIXTURES SHOWN ARE FOR ARCHITECTURAL COORDINATION AND DIMENSIONAL CONTROL ONLY. REF: MECHANICAL, ELECTRICAL, AND PLUMBING DRAWINGS AND SPECIFICATIONS.
2. NOT ALL FIXTURES MAY BE SHOWN ON ARCHITECTURAL ELEVATIONS
3. REFER TO SHEET G0.11 FOR TYPICAL SYMBOLS AND ABBREVIATIONS
4. REFER TO SHEET A9.31 FOR FINISH ABBREVIATIONS & DETAILS.
5. MECHANICAL REGISTERS IN WALLS PAINTED OTHER THAN PE1, SHALL BE FACTORY FINISHED TO MATCH ADJACENT WALL COLOR

FACILITY:

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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

INTERIOR ELEVATIONS - SECOND FLOOR

ADDENDUM #2

FILE NO.: 36-C1 | **A# : 04-119722**

DATE: **08.05.2021** | CLIENT PROJ NO:

SHEET:

A8.21

IF THE LINE SHOWN ABOVE IS NOT 1" LONG, THIS SHEET IS ORIGINAL PAPER SIZE

GENERAL NOTES

1. THE PURPOSE OF THIS SHEET IS TO DESCRIBE AND ILLUSTRATE DOOR TYPES. NOT ALL DOOR TYPES SHOWN ARE NECESSARILY USED. SEE DOOR SCHEDULE FOR DOOR TYPES USED.

2. FIRE DOORS, FIRE WINDOWS AND FIRE DAMPERS SHALL HAVE AN APPROVED LABEL OR LISTING MARK, INDICATING THE FIRE PROTECTION RATING WHICH IS PERMANENTLY AFFIXED AT THE FACTORY WHERE FABRICATION AND ASSEMBLY ARE DONE.

3. GLASS:
   A. INTERIOR DOORS:
      1. NON-RATED DOORS SHALL HAVE 1/4" CLEAR TEMPERED GLASS MIN, UNO.
      2. ALL RATED DOORS SHALL HAVE 1/4" CLEAR FIRE RATED GLASS MIN, UNO.
   B. MAXIMUM GLASS IN FIRE RATED DOORS:
      1. 20 MINUTE DOORS: 1296 SQUARE INCHES MAXIMUM.
      2. 60 MINUTE DOORS: 100 SQUARE INCHES MAXIMUM.
      3. 90 MINUTE DOORS: 100 SQUARE INCHES MAXIMUM PER LITE.

4. GLAZING IN THE FOLLOWING LISTED AREAS SHALL BE DEEMED TO BE LOCATED IN HAZARDOUS LOCATIONS AND SUBJECT TO HUMAN IMPACT, AND AS SUCH SHALL BE REQUIRED TO BE COMPOSED OF SAFETY GLAZING:
   A. INGRESS AND EGRESS DOORS.
   B. FIXED PANELS IN SWINGING DOORS.
   C. GLAZING IN FIXED PANELS ADJACENT TO A DOOR WHERE THE NEAREST EXPOSED EDGE OF THE GLAZING IS WITHIN A 24 INCH ARC OF EITHER VERTICAL EDGE OF THE DOOR ON A CLOSED POSITION AND WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 60 INCHES ABOVE THE WALKING SURFACE.
   D. GLAZING IN INDIVIDUAL FIXED PANELS WHERE:
      1. THE EXPOSED AREA OF THE INDIVIDUAL PANE EXCEEDS 9 SQUARE FEET.
      2. THE EXPOSED BOTTOM EDGE IS LESS THAN 18 INCHES ABOVE THE FLOOR.
      3. THE EXPOSED TOP EDGE IS GREATER THAN 36 INCHES ABOVE THE FLOOR.
      4. ONE OR MORE WALKING SURFACES WITHIN 36 INCHES HORIZONTALLY OF THE PLANE OF THE GLAZING.

5. EACH LIGHT OF THE GLAZING SHALL BEAR THE MANUFACTURER'S LABEL DESIGNATING THE TYPE AND THICKNESS OF GLASS. WHEN APPROVED BY THE AGENCY, LABELS MAY BE OMITTED FROM OTHER THAN SAFETY GLAZING MATERIALS, PROVIDED AN AFFIDAVIT IS FURNISHED BY THE GLAZING CONTRACTOR CERTIFYING THAT EACH LIGHT IS GLAZED IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATIONS. IDENTIFICATION OF GLAZING IN HAZARDOUS LOCATIONS AND SUBJECT TO HUMAN IMPACT SHALL BE ETCHED OR CERAMIC FIRED ON THE GLASS AND READABLE FROM THE INSIDE OF THE BUILDING AFTER INSTALLATIONS.

6. EXIT DOORS SHALL BE OPENABLE FROM THE INSIDE WITHOUT THE USE OF A KEY OR ANY SPECIAL KNOWLEDGE OR EFFORT.

7. PANIC HARDWARE SHALL COMPLY WITH THE REQUIREMENTS OF UBC STANDARD 10-4. THE ACTIVATING MEMBER SHALL BE MOUNTED AT A HEIGHT OF NOT LESS THAN 36 INCHES NOR MORE THAN 44 INCHES ABOVE THE FLOOR. THE UNLATCHING FORCE SHALL NOT EXCEED 15 POUNDS WHEN APPLIED IN THE DIRECTION OF TRAVEL.

8. DOOR ASSEMBLIES, APPROACHES AND FINISH HARDWARE SHALL BE IN COMPLIANCE WITH DISABLED ACCESS CONSTRUCTION STANDARDS.

9. THE MAXIMUM EFFORT TO OPERATE DOORS SHALL NOT EXCEED THE FOLLOWING:
   A. EXTERIOR DOORS = 5.0 POUNDS
   B. INTERIOR DOORS = 5.0 POUNDS
   C. FIRE DOORS = 15.0 POUNDS

10. DOOR OPENING LOCATIONS:
    A. IMMEDIATELY 6" FROM F.O.S. ADJACENT TO A FLANKING WALL U.N.O.
    B. DOOR OPENINGS IN OTHER LOCATIONS ARE LOCATED BY DIMENSIONS.

11. SEE SPECIFICATIONS FOR HARDWARE SCHEDULE

12. ALL DOOR FRAMES ARE WELDED FRAMES, UNLESS NOTED OTHERWISE
    FRAME DEPTH TO BE DETERMINED BY OVERALL WALL THICKNESS

13. FINISH FLOOR TRANSITIONS OCCUR AT CENTERLINE OF DOORS, UNLESS NOTED OTHERWISE

14. ALL INTERIOR DOORS WITH FIRE-RATINGS GREATER THAN 20 MINUTE SHALL HAVE A NONCOMBUSTIBLE SILL WITH AN UNDERCUT OF 3/8" MAXIMUM ABOVE THE SILL.

15. MIN. 32" CLEAR WIDTH: AT LEAST ONE ACTIVE LEAF TO MEET 32" CLEAR WIDTH.

16. THE BOTTOM 10 INCHES OF ALL DOORS AND GATES TO HAVE SMOOTH UNINTERRUPTED SURFACE TO ALLOW THE DOOR TO BE OPENED BY A WHEELCHAIR FOOTREST WITHOUT CREATING A TRAP OR HAZARDOUS CONDITION (CBC. 11B-404.2.1.0).

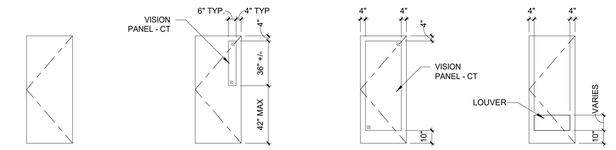
17. DOOR THRESHOLD NOT TO EXCEED 1/2" WITH BEVELED SLOPE NOT MORE THAN 2:1 FOR THE UPPER 1/4" (CBC. 11B-303.3).

18. EACH LIGHT OF SAFETY GLAZING MATERIAL IN HAZARDOUS LOCATIONS AS DEFINED IN SECTION 2406 OF CHAPTER 24, "GLASS AND GLAZING," SHALL BE IDENTIFIED BY A LABEL WHICH WILL SPECIFY THE LABELER, WHETHER THE MANUFACTURER OR INSTALLER, AND STATE THAT SAFETY GLAZING MATERIAL HAS BEEN UTILIZED IN SUCH INSTALLATIONS. THE LABEL SHALL BE LEGIBLE AND VISIBLE FROM THE INSIDE OF THE BUILDING AFTER INSTALLATION AND SHALL SPECIFY THAT THE LABEL SHALL NOT BE REMOVED.

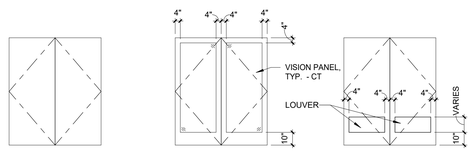
19. EACH PANE SHALL BEAR THE MANUFACTURER'S MARK DESIGNATING THE TYPE AND THICKNESS OF THE GLASS OR GLAZING MATERIAL. SAFETY GLAZING SHALL BE IDENTIFIED IN ACCORDANCE WITH CBC SECTION 2406.3. EACH PANE OF TEMPERED GLASS, EXCEPT TEMPERED SPANDREL GLASS, SHALL BE PERMANENTLY IDENTIFIED BY THE MANUFACTURER. THE IDENTIFICATION MARK SHALL BE ACID ETCHED, SAND BLASTED, CERAMIC FIRED, LASER ETCHED, EMBOSSED OR OF A TYPE THAT, ONCE APPLIED CANNOT BE REMOVED WITHOUT BEING DESTROYED. TEMPERED SPANDREL GLASS SHALL BE PROVIDED WITH A REMOVABLE PAPER MARKING BY THE MANUFACTURER.

DOOR TYPE LEGEND

PNL-F- XX-
- DOOR PANEL TYPE - SEE BELOW
- DOOR PANEL MATERIAL /FINISH - SEE LEGEND



PNL-F PNL-N PNL-FG PNL-L



PNL-F PNL-FG PNL-L

DOOR FRAME LEGEND

FRM-##XX-
- DOOR FRAME TYPE - SEE BELOW
- DOOR FRAME MATERIAL / FINISH - SEE LEGEND

FRM-00HM FRM-00HM FRM-10HM FRM-00AL

FRM-50AL

DOOR SCHEDULE

DOOR NUMBER	SIZE WIDTH PANEL 1	SIZE WIDTH PANEL 2	SIZE HEIGHT	DOOR TYPE	FRAME TYPE	FIRE RATING (MINUTES)	HARDWARE GROUP	PANIC HARDWARE	UNDERCUT	DETAIL HEAD	DETAIL JAMB	DETAIL SILL	COMMENTS
FIRST FLOOR													
100-A	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	13	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL & AUTOMATIC DOOR OPERATORS
100-B	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	14	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
100-C	3'-0"		9'-0"	PNL-FG-AL	FRM-00AL	0	01	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
100-D	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	13B	No	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
100-E	3'-0"		9'-0"	PNL-FG-AL	FRM-00AL	0	01	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
100A-A	3'-0"		7'-0"	PNL-F-HM	FRM-00HM	0	04B	No	0"	4/A10.21	4/A10.21	7/A10.21	
101-A	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	15	No	0"	13/A10.22	7/A10.22	7/A10.21	ACCESS CONTROL, ADG-1
101-B	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	14	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
101-C	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	14	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
101A-A	3'-0"	3'-0"	7'-0"	PNL-F-HM	FRM-00HM	0	16	No	0"	4/A10.21	4/A10.21	7/A10.21	
101B-A	3'-0"		7'-0"	PNL-F-HM	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
102-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	11	No	3/4"	5/A10.21	5/A10.21	7/A10.21	
103-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	12	No	0"	5/A10.21	5/A10.21	7/A10.21	AUTOMATIC DOOR OPERATORS
104-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	12	No	0"	5/A10.21	5/A10.21	7/A10.21	AUTOMATIC DOOR OPERATORS
105-A	3'-0"		7'-0"	PNL-F-HM	FRM-00HM	0	03	No	0"	3/A10.21	3/A10.21	1/A10.21	
106-A	4'-0"		8'-0"	PNL-F-HM	FRM-00HM	0	03A	No	0"	3/A10.21	3/A10.21	1/A10.21	
107-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
108-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
109-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
111-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
112-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
113-A	3'-0"	3'-0"	7'-0"	PNL-F-WD	FRM-00HM	0	16	No	0"	4/A10.21	4/A10.21	7/A10.21	
114-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	45	10	No	0"	4/A10.21	4/A10.21	6/A10.21	
115-A	3'-0"	3'-0"	9'-0"	PNL-FG-AL	FRM-00AL	0	13A	No	0"	13/A10.22	7/A10.22	7/A10.21	ACCESS CONTROL, AUTOMATIC DOOR OPERATORS, ADG-1
115-B	3'-0"		9'-0"	PNL-FG-AL	FRM-00AL	0	02	Yes	0"	13/A10.22	7/A10.22	1/A10.21	ACCESS CONTROL
115B-A	3'-0"		7'-0"	PNL-N-WD	FRM-00HM	0	06A	No	0"	4/A10.21	4/A10.21	7/A10.21	ADG-1
115C-A	3'-0"		7'-0"	PNL-N-WD	FRM-00HM	0	04A	No	0"	4/A10.21	4/A10.21	7/A10.21	ADG-1
115D-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115E-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115G-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115H-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115K-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115L-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115N-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	17	No	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
115Q-A	3'-0"		9'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
115R-A	3'-0"		9'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	

DOOR SCHEDULE

DOOR NUMBER	SIZE WIDTH PANEL 1	SIZE WIDTH PANEL 2	SIZE HEIGHT	DOOR TYPE	FRAME TYPE	FIRE RATING (MINUTES)	HARDWARE GROUP	PANIC HARDWARE	UNDERCUT	DETAIL HEAD	DETAIL JAMB	DETAIL SILL	COMMENTS
SECOND FLOOR													
202-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	11	No	3/4"	5/A10.21	5/A10.21	7/A10.21	
203-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	12	No	0"	5/A10.21	5/A10.21	7/A10.21	AUTOMATIC DOOR OPERATORS
204-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	12	No	0"	5/A10.21	5/A10.21	7/A10.21	AUTOMATIC DOOR OPERATORS
205-A	3'-0"	2	7'-0"	PNL-F-WD	FRM-00HM	0	11A	No	0"	5/A10.21	5/A10.21	7/A10.21	ADG-1
206-A	3'-0"		8'-0"	PNL-F-WD	FRM-00HM	45	10	No	0"	4/A10.21	4/A10.21	6/A10.21	
207-A	3'-0"		8'-0"	PNL-F-WD	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
208-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	4/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
209-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
210-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
211-A	3'-0"		7'-0"	PNL-N-WD	FRM-10HM	0	08	No	0"	2/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL, ADG-1
212-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
213-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	04	No	0"	4/A10.21	4/A10.21	7/A10.21	
214-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	18	Yes	0"	17/A10.26	19/A10.26	16/A10.26	ACCESS CONTROL
214-B	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	09	Yes	0"	4/A10.21	4/A10.21	7/A10.21	ACCESS CONTROL
214A-A	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	11	No	3/4"	5/A10.21	5/A10.21	7/A10.21	
214B-A	3'-0"		7'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	17/A10.26	19/A10.26	11/A10.26	
214C-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214D-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214E-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214F-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214G-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214H-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214J-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214K-A	3'-0"		10'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	13/A10.26	14/A10.26	11/A10.26	
214L-A	3'-0"		7'-0"	PNL-FG-WD	FRM-50AL	0	20	No	0"	17/A10.26	19/A10.26	11/A10.26	
214M-A	3'-0"		7'-0"	PNL-N-WD	FRM-00HM	0	07	No	0"	4/A10.21	4/A10.21	7/A10.21	
214M-B	3'-0"		7'-0"	PNL-F-WD	FRM-00HM	0	06	No	0"	4/A10.21	4/A10.21	7/A10.21	ADG-1
214N-A	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	19	Yes	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1
214N-B	3'-0"		7'-0"	PNL-FG-WD	FRM-00AL	0	19	Yes	0"	17/A10.26	19/A10.26	16/A10.26	ADG-1

DOOR SCHEDULE

DOOR NUMBER	SIZE WIDTH PANEL 1	SIZE WIDTH PANEL 2	SIZE HEIGHT	DOOR TYPE	FRAME TYPE	FIRE RATING (MINUTES)	HARDWARE GROUP	PANIC HARDWARE	UNDERCUT	DETAIL HEAD	DETAIL JAMB	DETAIL SILL	COMMENTS
ROOF													
300-A	3'-0"		7'-0"	PNL-F-HM	FRM-00HM	0	03	No	0"	3/A10.21	3/A10.21	1/A10.21 SIM.	

GATE SCHEDULE

NUMBER	SIZE WIDTH PANEL 1	SIZE WIDTH PANEL 2	SIZE HEIGHT	DOOR MATERIAL	FIRE RATING (MINUTES)	HARDWARE GROUP	PANIC HARDWARE	COMMENTS
G-001	7'-0"	7'-0"	8'-0"	SEE ELEVATION, 3/A7.61	0	21	No	

DOOR MATERIAL/FINISH LEGEND

A	ALARM CONTACT
AL	ALUMINUM
ADG-1	ACOUSTIC DOOR GASKET
AO	AUTOMATIC DOOR OPERATOR
CA	CLEAR ANODIZED
CL	COMBO LOCK
CR	CARD READER
CT	CLEAR TEMPERED GLAZING
CW	CURTAIN WALL
DE	DOUBLE EGRESS
EB	"PUSH TO EXIT" EMERGENCY BUTTON
EL	ELECTRICAL LOCK
ET	ENTRY TELEPHONE
FF	FACTORY FINISHED
FRG	FIRE RATED GLASS
FRG/	FIRE RATED GLASS & FRAMING
GL	GLASS
HB	HELP BUTTON
HM	HOLLOW METAL
IC	INTERCOM
IG	INSULATING GLASS
IP	INFILL PANEL
KD	KNOCK DOWN FRAME
LA	LOCAL ALARM
M	MONITOR
MG	MIRROR GLASS
MHO	MAGNETIC HOLD OPEN
NR	NOT RATED
PB	PANIC BAR
PL	PRIVACY LOCK
PL#	PLASTIC LAMINATE
PP	PUSH PLATE (# OF PLATES)
PT	PAINT (FACTORY FINISH ALL WOOD DOORS TYPICAL, FIELD PAINT H.M. DOOR AND FRAME
REX	REQUEST TO EXIT MOTION SENSOR
RF	RF COPPER SHIELDED NON-FERROUS SYSTEM
S	STAIN GRADE WOOD VENEER
SC	SOLID CORE
SG	SAFETY GLASS
SHD	SHIELDED DOOR FRAME / GLASS. LEAD REQUIREMENTS TO MATCH ADJACENT WALL U.O.N.
SPG	SPANDREL GLASS
STL	STEEL
SM	SMOKE BARRIER SEAL (NON-RATED DOOR W/ TIGHT FITTING SMOKE GASKET)
UC	UNDERCUT
VP	VISION PANEL
WF	WELDED STEEL FRAME
WG	WIRE GLASS
WD	WOOD
WS	WAVE SENSOR

PLEASE RECYCLE

2/10/2022 8:48:30 AM

AGENCY APPROVAL:

Chaffey College

HMC Architects

5009006-000

3546 CONCOURS STREET
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909 989 9979 / www.hmcarchitects.com

LICENSED ARCHITECT KENNETH SALTER NO. C-19082 REN. 11-30-21 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

NOTES

1. FOR DOORS INDICATED WITH "ADG-1" SEE ACOUSTIC DOOR GASKET SPECIFICATIONS (08 71 00) FOR ADDITIONAL REQUIREMENTS IN ADDITION TO ANY REQUIREMENTS OUTLINED IN THE DOOR HARDWARE GROUP.

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

DOOR SCHEDULE

ADDENDUM #2

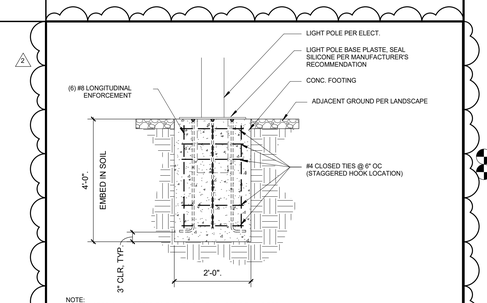
FILE NO.: **36-C1** A# : **04-119722**

DATE: **08.05.2021** CLIENT PROJ NO:

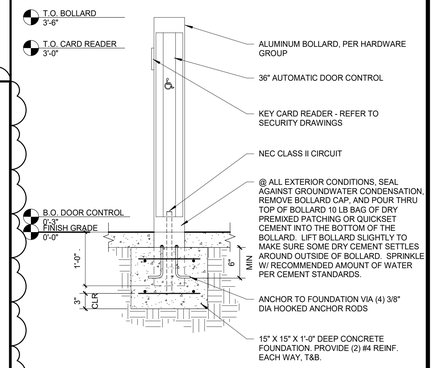
SHEET:

A9.11

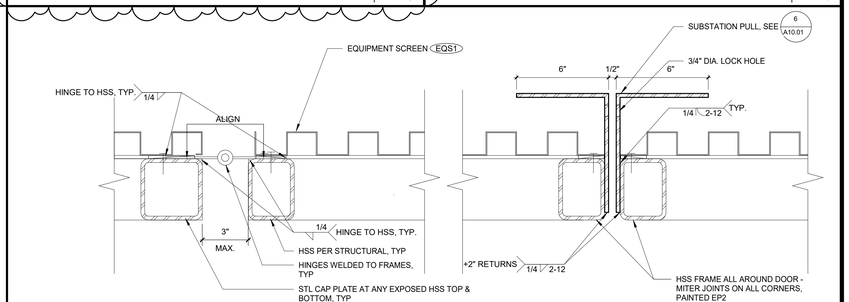
THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL PAGE SIZE



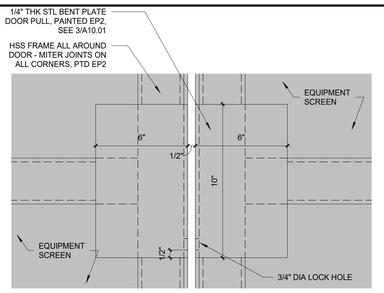
LIGHTING FIXTURE TYPE P FOOTING 9 — 1" = 1'-0"



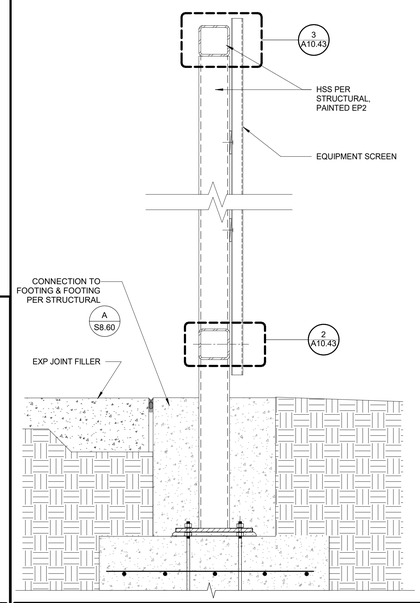
ACCESS AUTO DOOR OPERATOR BOLLARD 4 — 1" = 1'-0"



SUBSTATION SCREEN - HINGE 3 — 3" = 1'-0"



SUBSTATION - PULL 6 — 3" = 1'-0"



SUBSTATION SCREEN - POST 1 — 1 1/2" = 1'-0"

2/10/2022 2:26:01 PM

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AGENCY APPROVAL:

Chaffey College

HMC Architects

5009006-000

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LICENSED ARCHITECT KENNETH SALYER NO. C-19982 REN. 11-30-22 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

SITE DETAILS

ADDENDUM #2

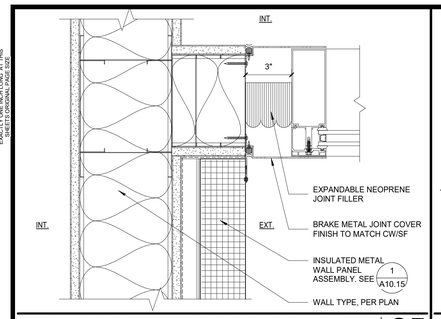
FILE NO.: 36-C1 | A# : 04-119722

DATE: 08.05.2021 | CLIENT PROJ NO:

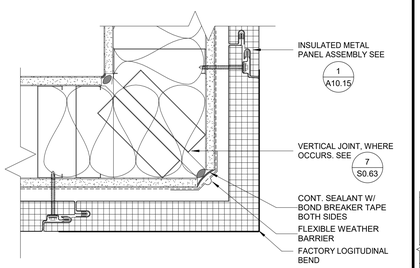
SHEET:

A10.01

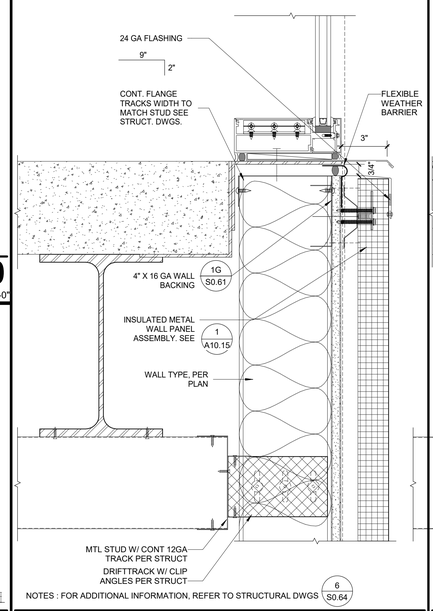
THE LINE SHOWN ABOVE IS 3" LONG ON THIS SHEET'S ORIGINAL SPACE SIZE



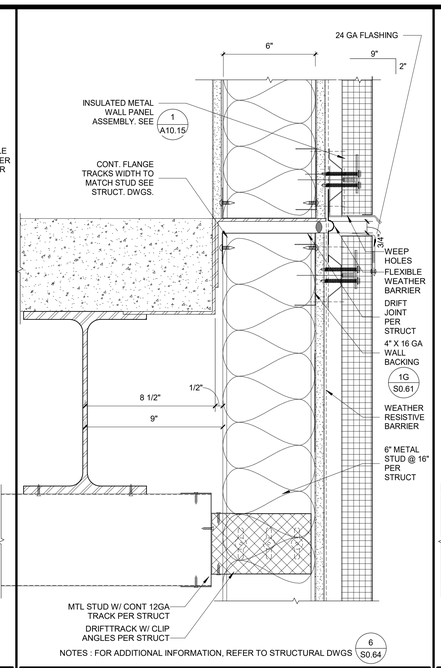
EXTERIOR WALL - INSIDE CORNER MP @ DRIFT JOINT — 25 — 3" = 1'-0"



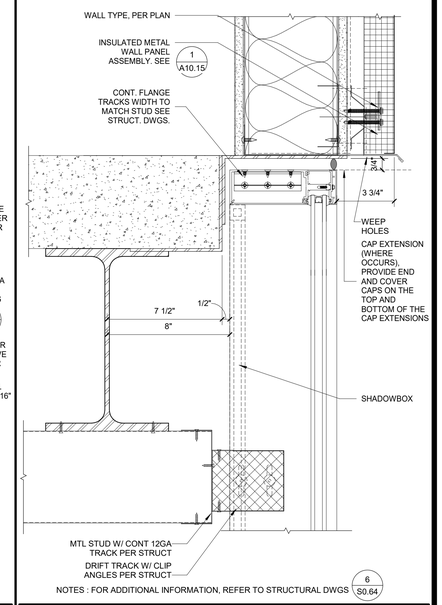
DEFLECTION JOINT @ OUTSIDE CORNER MTL PANEL — 20 — 3" = 1'-0"



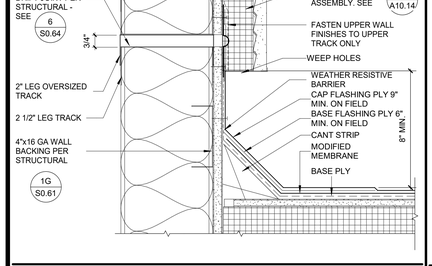
DRIFT JOINT @ FLOOR/CW SILL - IMP — 14 — 3" = 1'-0"



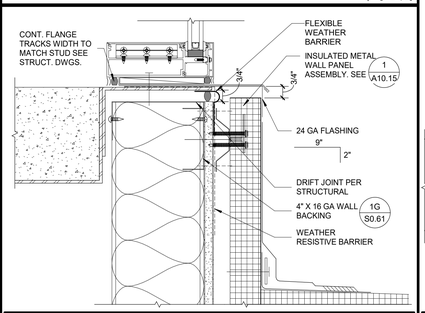
DRIFT JOINT @ FLOOR - IMP — 9 — 3" = 1'-0"



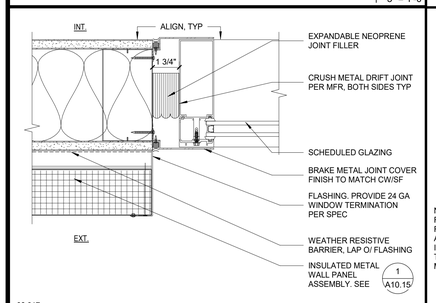
DRIFT JOINT @ FLOOR/CW HEAD - IMP — 4 — 3" = 1'-0"



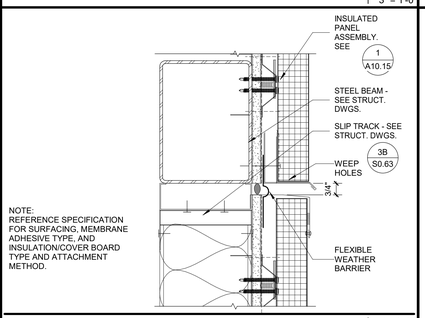
DRIFT JOINT @ EXT PLASTER - ROOF — 24 — 3" = 1'-0"



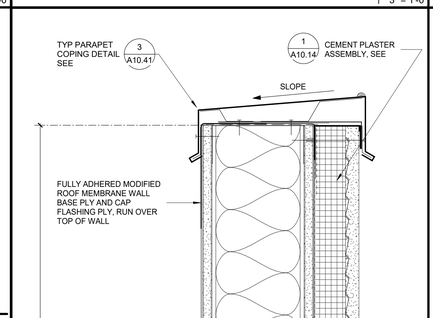
DRIFT JOINT @ FLOOR/CW SILL - ROOF — 19 — 3" = 1'-0"



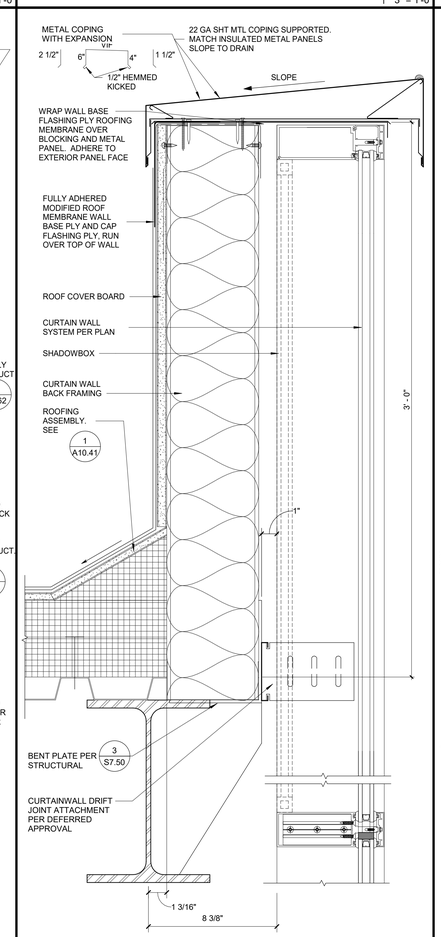
EXT CW JAMB @ IMP W/ DRIFT JOINT — 23 — 3" = 1'-0"



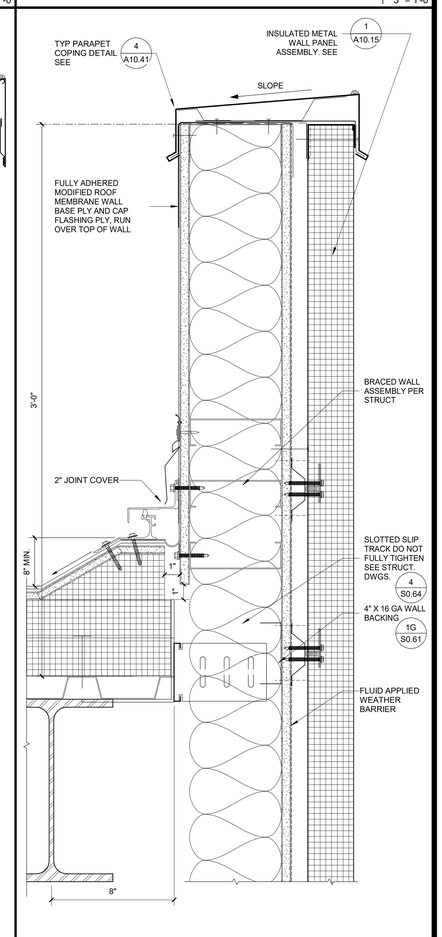
DRIFT JOINT @ STAIR #2 BEAM - IMP — 18 — 3" = 1'-0"



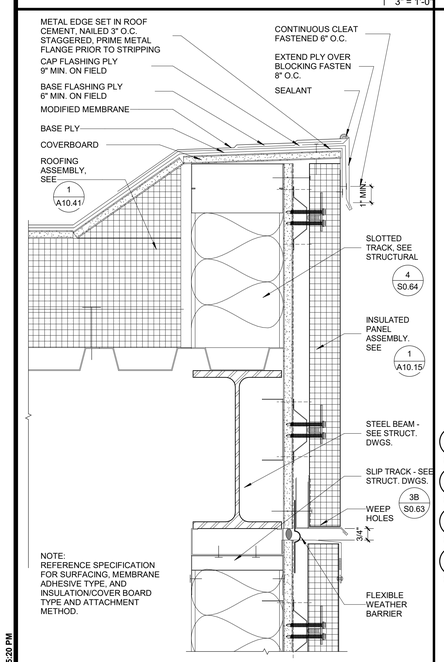
DRIFT JOINT @ ROOF PARAPET - PLASTER — 11 — 3" = 1'-0"



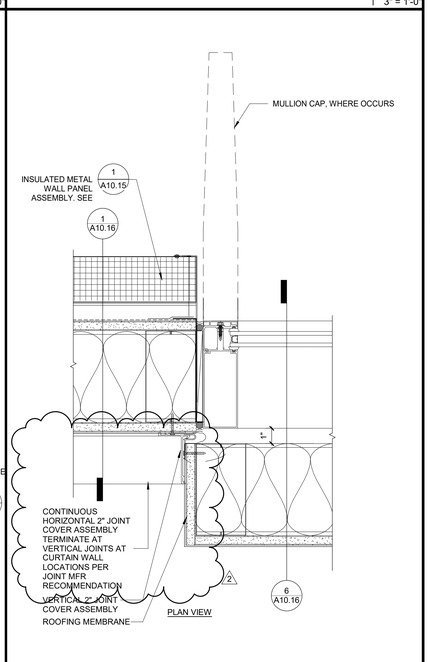
DRIFT JOINT @ ROOF PARAPET - CW — 6 — 3" = 1'-0"



DRIFT JOINT @ ROOF PARAPET - IMP — 1 — 3" = 1'-0"



DRIFT JOINT @ STAIR #2 ROOF PARAPET - IMP — 21 — 3" = 1'-0"



EXT CW JAMB W/ ALUMINUM CAP EXTENSION @ IMP W/ DRIFT JOINT — 16 — 3" = 1'-0"

2/10/2022 1:15:23 PM

PLEASE RECYCLE

AGENCY APPROVAL:

Chaffey College

HMC Architects

5009006-000

LICENSED ARCHITECT KENNETH SALTER NO. C-19082 REN. 11-30-23 STATE OF CALIFORNIA

3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

WALL DETAILS - DRIFT JOINTS

ADDENDUM #2

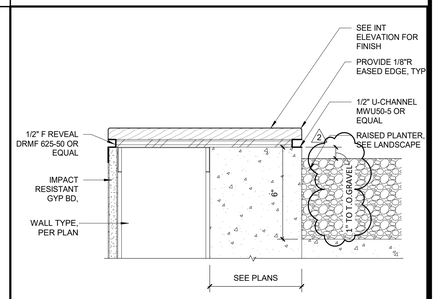
FILE NO.: **36-C1** | A# : **04-119722**

DATE: **08.05.2021** | CLIENT PROJ NO:

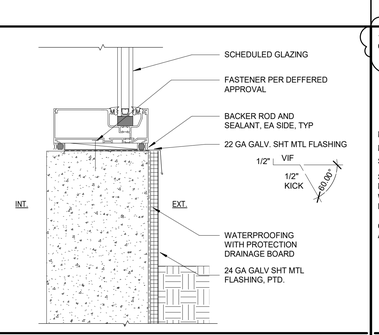
SHEET:

A10.16

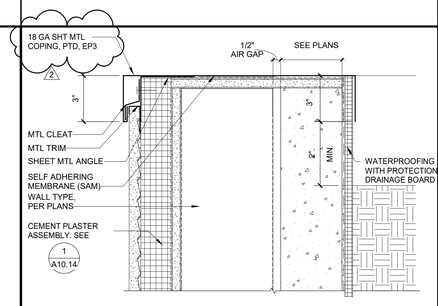
THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL SPACE SIZE



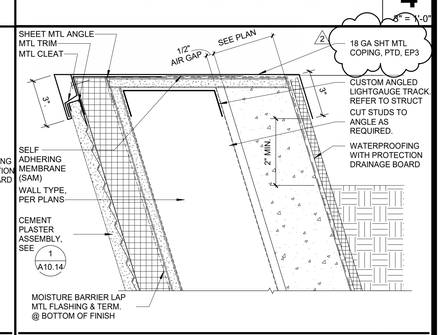
INTERIOR PLANTER WALL - TOP 4 — 3" = 1'-0"



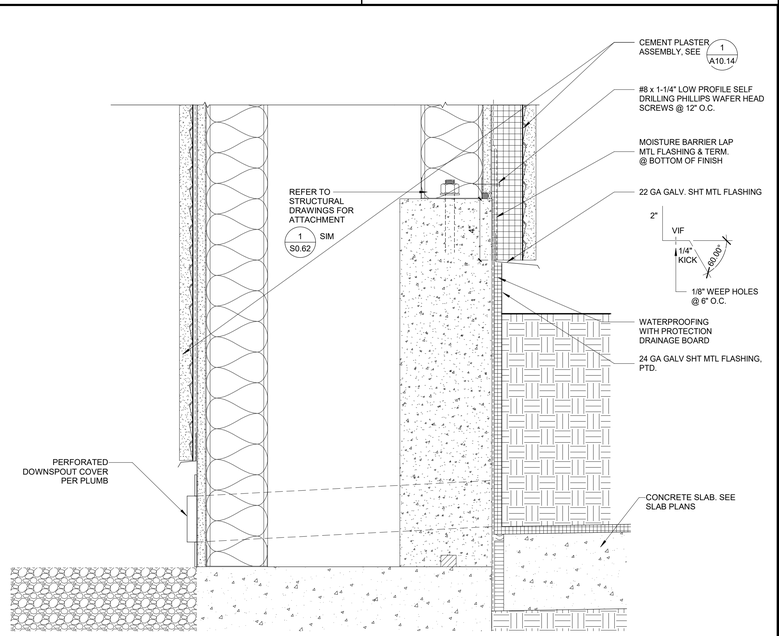
EXTERIOR WALL - PLANTER - CW ON TOP 13 — 3" = 1'-0"



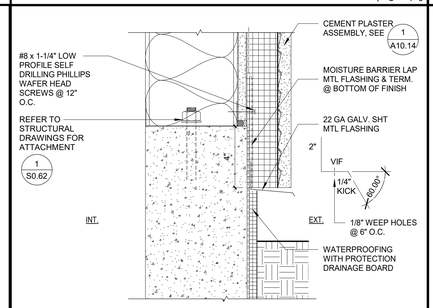
EXTERIOR WALL - PLANTER - WALL TOP 8 — 3" = 1'-0"



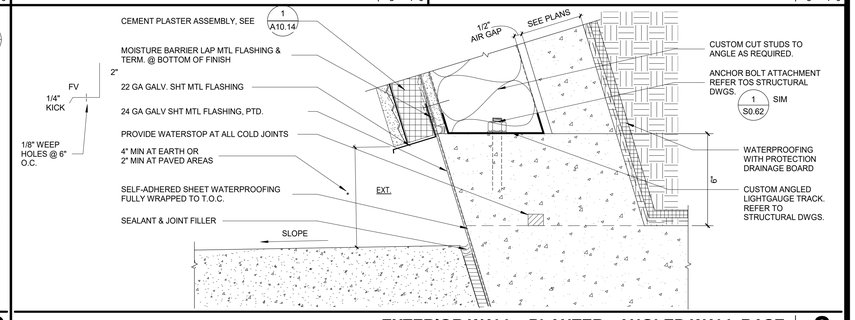
EXTERIOR WALL - PLANTER - ANGLED WALL TOP 3 — 3" = 1'-0"



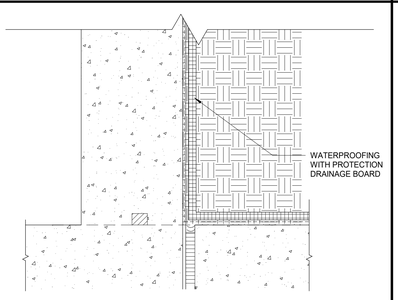
EXTERIOR WALL - PLANTER - DRAINAGE 16 — 3" = 1'-0"



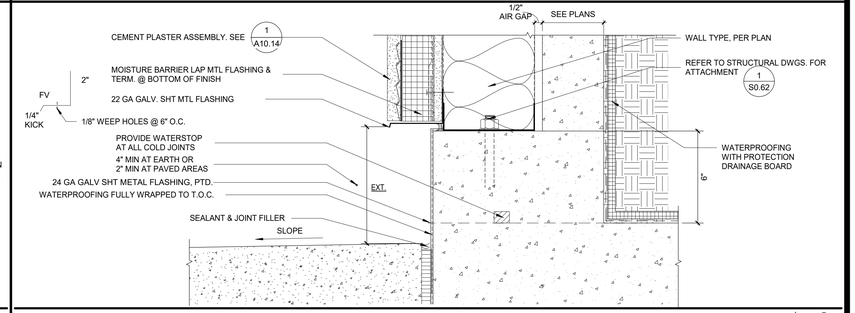
EXTERIOR WALL - PLANTER - WALL ON TOP 12 — 3" = 1'-0"



EXTERIOR WALL - PLANTER - ANGLED WALL BASE 2 — 3" = 1'-0"



EXTERIOR WALL - PLANTER WALL CONCRETE BASE 11 — 3" = 1'-0"



EXTERIOR WALL - PLANTER WALL BASE 1 — 3" = 1'-0"

2/10/2022 10:57:14 AM

PLEASE RECYCLE

AGENCY APPROVAL:

Chaffey College

HMC Architects

5009006-000

3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

LICENSED ARCHITECT — KENNETH SALYER — NO. C-19082 — REN. 11-30-22 — STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

PLANTER DETAILS

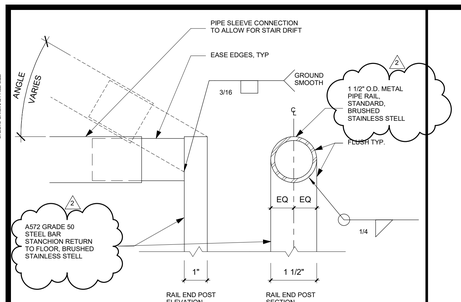
ADDENDUM #2

FILE NO.: **36-C1** | A# : **04-119722**

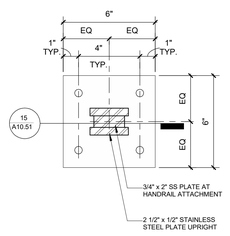
DATE: **08.05.2021** | CLIENT PROJ NO:

SHEET:

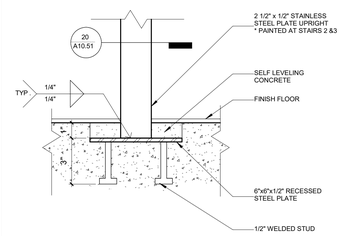
A10.17



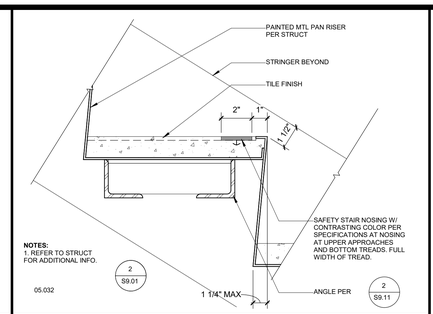
HANDRAIL @ SLEEVE CONNECTION — 25
6" = 1'-0"



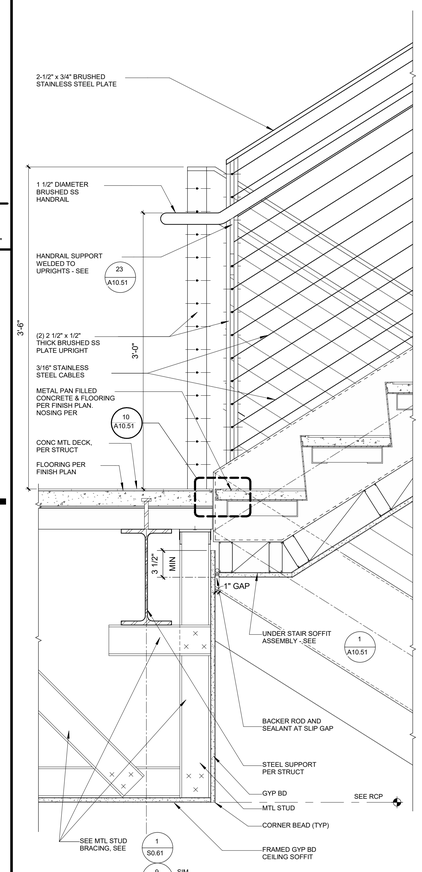
ENLARGED PLAN OF GUARDRAIL BASE PLATE — 20
3" = 1'-0"



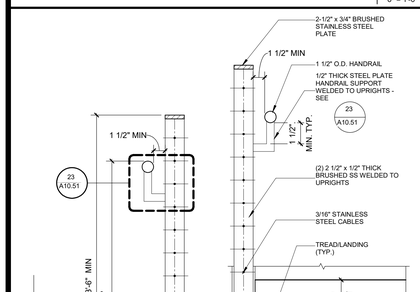
GUARDRAIL BASE SECTION @ SLAB ON GRADE — 15
3" = 1'-0"



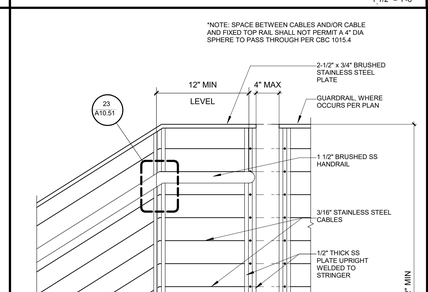
STAIR NOSING - GROOVED1 — 10
3" = 1'-0"



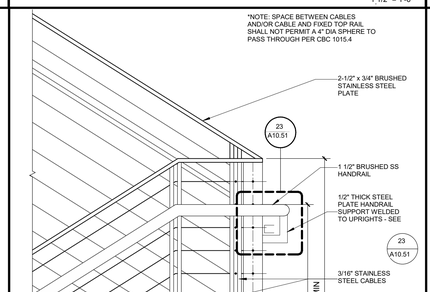
STAIR ELEVATION LEVEL 2 LANDING — 3
1 1/2" = 1'-0"



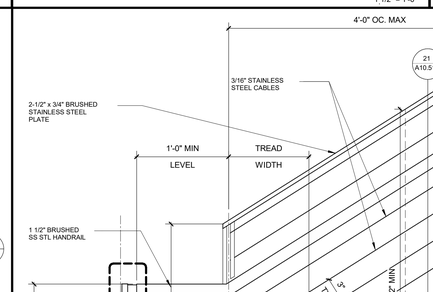
TYP. RECESSED LINEAR FIXTURE @ FRAMED GYP. CEILING/ WALL — 24
3" = 1'-0"



INTERMEDIATE STAIR LANDING 02 — 18
1 1/2" = 1'-0"



STAIR @ LANDING SECTION — 13
1 1/2" = 1'-0"



STAIR LANDING END SECTION — 8
1 1/2" = 1'-0"

HANDRAIL — 23
6" = 1'-0"

TOP STAIR LANDING 01 — 16
1 1/2" = 1'-0"

INTERMEDIATE STAIR LANDING 01 — 11
1 1/2" = 1'-0"

STAIR FOOT LANDING TRANSITION ELEVATION — 1
1 1/2" = 1'-0"

SECTION THRU STAIR — 21
1 1/2" = 1'-0"

AGENCY APPROVAL:

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5009006-000
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LICENSED ARCHITECT KENNETH SALYER NO. C-19082 REN. 11-30-23 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
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CHINO, CA 91710

PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
STAIR DETAILS

ADDENDUM #2

FILE NO.: 36-C1 — A# : 04-119722

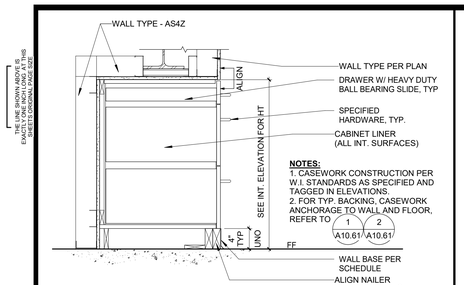
DATE: 08.05.2021 — CLIENT PROJ NO:

SHEET:

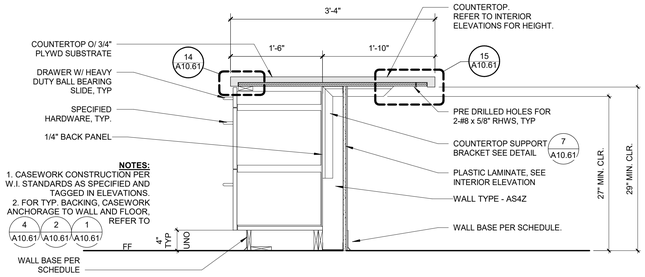
A10.51

2/8/2022 11:35:55 AM

PLEASE RECYCLE

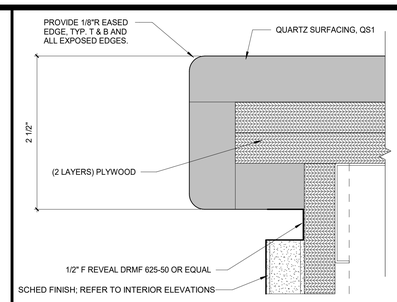


RECESSED BASE CABINET | 25
1" = 1'-0"

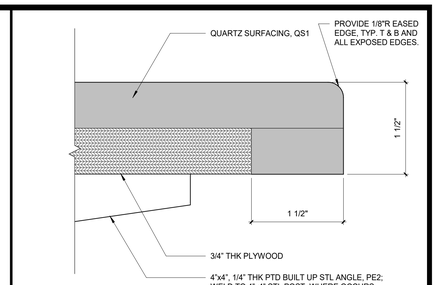


NOTE: THERE SHALL BE NO SHARP OR ABRASIVE SURFACES BELOW COUNTER

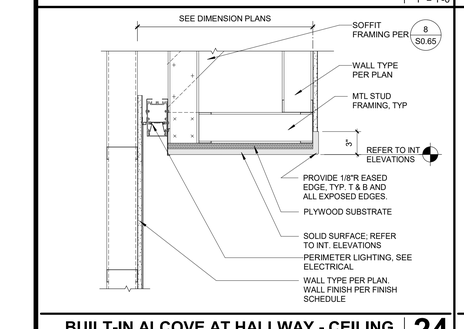
COUNTERTOP SUPPORT @ ISLAND | 15
1" = 1'-0"



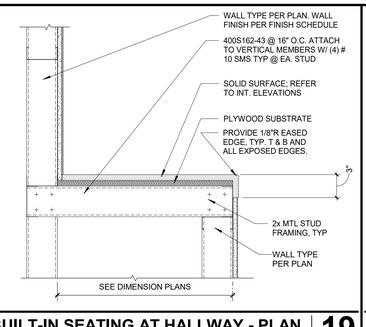
RECEPTION DESK - SURFACE EDGE 02 | 10
12" = 1'-0"



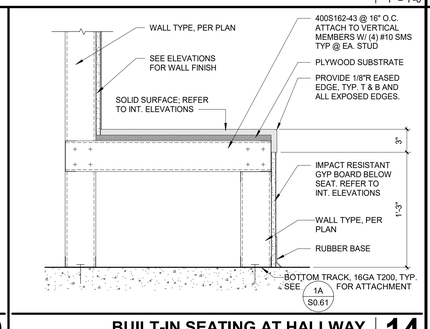
RECEPTION DESK - SURFACE EDGE 01 | 5
12" = 1'-0"



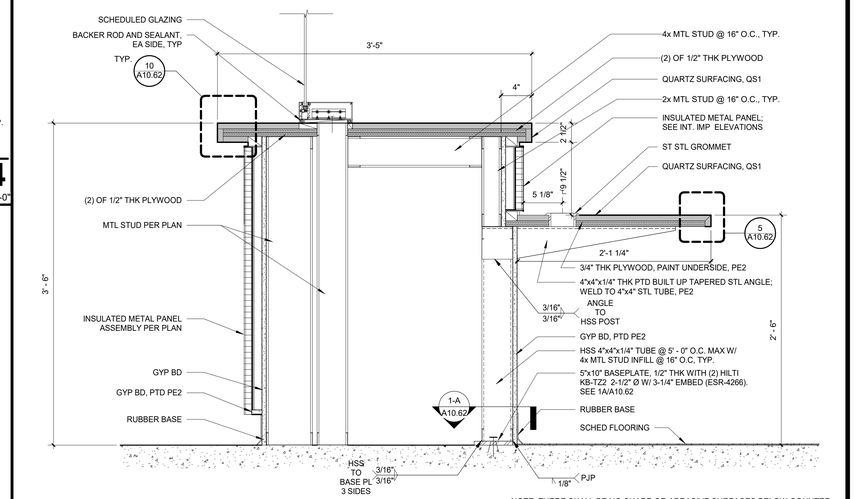
BUILT-IN ALCOVE AT HALLWAY - CEILING | 24
1 1/2" = 1'-0"



BUILT-IN SEATING AT HALLWAY - PLAN VIEW | 19
1 1/2" = 1'-0"

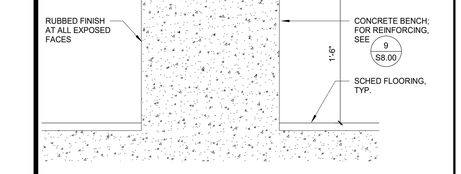


BUILT-IN SEATING AT HALLWAY | 14
1 1/2" = 1'-0"

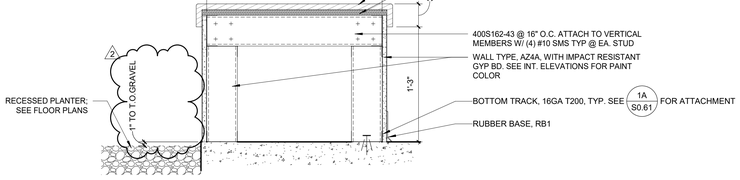


NOTE: THERE SHALL BE NO SHARP OR ABRASIVE SURFACES BELOW COUNTER

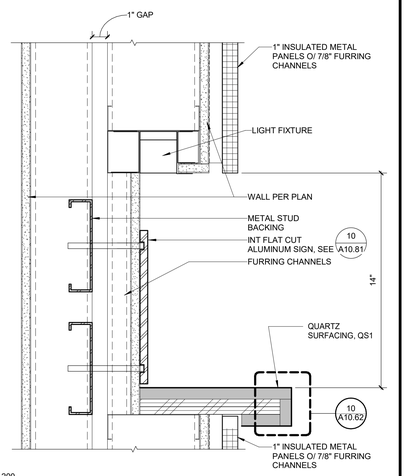
RECEPTION DESK - SECTION AT CW | 3
1 1/2" = 1'-0"



INT. CONCRETE BENCH | 23
1 1/2" = 1'-0"

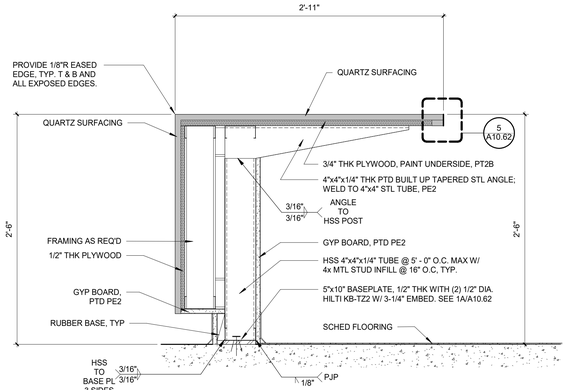


BUILT-IN SEATING AT PLANTER | 13
1 1/2" = 1'-0"



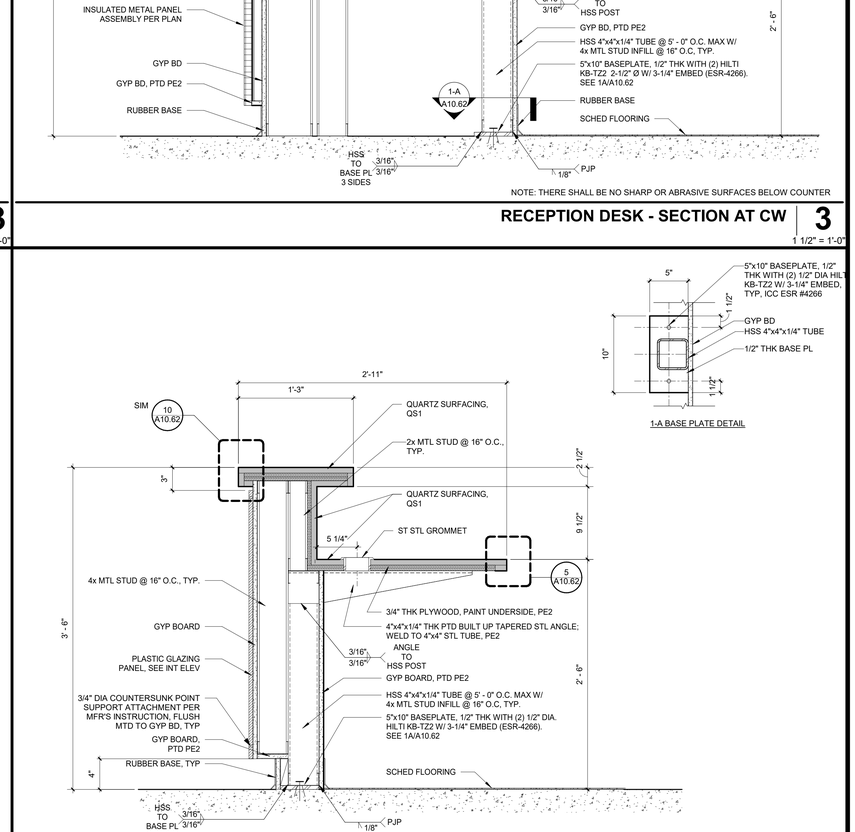
09.200

LOBBY ALCOVE | 21
3" = 1'-0"



NOTE: THERE SHALL BE NO SHARP OR ABRASIVE SURFACES BELOW COUNTER

RECEPTION DESK - SECTION 02 | 11
1 1/2" = 1'-0"



NOTE: THERE SHALL BE NO SHARP OR ABRASIVE SURFACES BELOW COUNTER

RECEPTION DESK - SECTION 01 | 1
1 1/2" = 1'-0"

2/1/2022 10:58:06 AM

PLEASE RECYCLE

AGENCY APPROVAL:

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HMC Architects

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3546 CONCOURS STREET
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LICENSED ARCHITECT KENNETH SALTER NO. C-19082 REN. 11-30-22 STATE OF CALIFORNIA

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM #2	2.11.2022

KEYNOTES

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

MILLWORK DETAILS

ADDENDUM #2

FILE NO.: **36-C1** | A# : **04-119722**

DATE: **08.05.2021** | CLIENT PROJ NO:

SHEET:

A10.62

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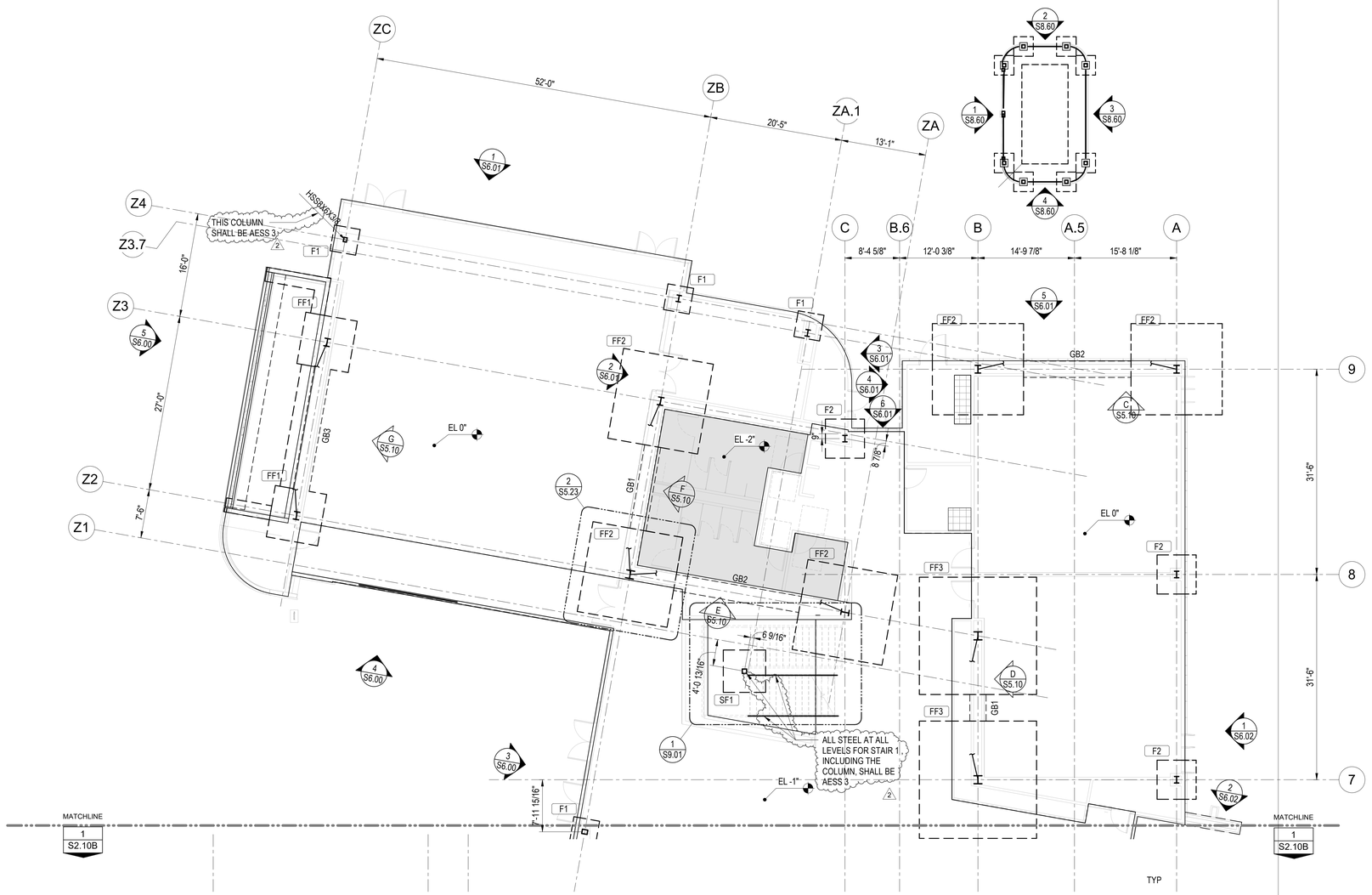

FOUNDATION PLAN NOTES

1. FOR GENERAL NOTES SEE **S0.X** SERIES SHEETS. TYPICAL DETAILS OCCUR THROUGHOUT THESE STRUCT DWGS IN ADDITION TO THOSE ON **S2.X** SERIES SHEETS.
2. VERIFY CONC SLAB ELEVATIONS INCLUDING SLAB DEPRESSIONS, SLOPES, OPNGS, CURBS, DRAINS, TRENCHES, & SLAB EDGE LOCATIONS; & WALL OVERALL DIMENSIONS INCLUDING LOCATIONS OF OPNGS WITH ARCHITECTURAL DWGS.
3. SEE ARCHITECTURAL DWGS FOR REMAINDER OF DIMENSIONS & ELEVATIONS NOT SHOWN ON STRUCT DWGS. VERIFY ALL DIMENSIONS & ELEVATIONS W/ ARCHITECTURAL DWGS PRIOR TO START OF WORK.
4. VERIFY EXTENT OF EXISTING UNDERGROUND UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
5. FOUNDATION EXCAVATIONS MUST BE OBSERVED AND APPROVED BY PROJECT GEOTECHNICAL CONSULTANT PRIOR TO PLACING REINFORCING STEEL.
6. LOCATE NEW SUBGRADE UTILITIES AS INDICATED ON STRUCT AND MEP DRAWINGS. IDENTIFY LOCATIONS AND INVERT ELEVATIONS OF AFFECTED EXISTING UTILITIES PRIOR TO START OF WORK. NOTIFY SEOR IF LOCATIONS ARE OTHER THAN AS NOTED, OR REQUIRE ADDITIONAL DEMO, CONSTRUCTION, OR EXCAVATION BELOW NOTED LIMIT LINES. DO NOT PENETRATE EXISTING STRUCTURE OR EXCAVATE BELOW EXISTING OR NEW FOUNDATIONS WITHOUT APPROVAL OF SEOR.
7. CENTER COLUMNS ON GRIDLINES UNO.
8. LOCATE TOP OF FOOTINGS 1'-6" BELOW LOWEST ADJACENT BUILDING SLAB ON GRADE ELEVATION OR TOP OF LOWEST ADJACENT EXTERIOR FINISH GRADE (OR FINISH PAVING) ELEVATION UNO.
9. TYPICAL SLAB ON GRADE SHALL BE AS FOLLOWS UNO:
   A. 5" CONCRETE SLAB W/ #4@18"OC EACH WAY AT CENTER OF SLAB OVER
   B. 15 MIL MOISTURE BARRIER OVER 4" MOISTENED (NOT SATURATED) CLEAN AGGREGATE OVER
   C. COMPACTED FILL PER GEOTECHINCAL REPORT.
10. PROVIDE CONSTRUCTION JOINTS AND CONTROL JOINTS IN SLAB ON GRADE PER **5** / **S0.12** AND AS REQD PER ARCHITECTURAL DWGS.
11. PROVIDE STRUCTURAL STEEL FRAMING TO SUPPORT ELEVATOR GUIDERAILS AND ELEVATOR COUNTERWEIGHTS PER **S0.91**.

FOUNDATION LEGEND

- EL XXX'-XX" — TOP OF SLAB ELEVATION - VERIFY W/ ARCHITECTURAL DWGS
- F1 -1'-6" — SPREAD FOOTING TYPE PER **1** / **S3.01**; TOP OF FTG ELEVATION, SEE NOTE 8
- S — STEP IN CONTINUOUS FOOTING OR GRADE BEAM PER SYMBOL DENOTES LOCATION OF STEP AT TOP OF FOOTING
- TOF -X'-X" — TOP OF FOOTING ELEVATION RELATIVE TO TOP OF LOWEST ADJACENT BUILDING SLAB ON GRADE ELEVATION OR TOP OF LOWEST ADJACENT EXTERIOR FINISH GRADE (OR FINISH PAVING) ELEVATION, WHICHEVER IS LOWER - IF NO ELEVATION INDICATED, PLAN NOTE 8 APPLIES
- NON-FRAME STEEL COLUMN MARK - SEE COLUMN SCHEDULE ON SHEET **S4.01**.
- X" — CHANGE IN TOP OF SLAB ON GRADE ELEVATION - VERIFY DROP DISTANCES (WHERE INDICATED) W/ ARCHITECTURAL DWGS
- XX / XX — MECH UNIT NO - SEE MECH DWGS
- XXX# — MAXIMUM DESIGN OPERATING WT
- MECH PAD - SEE **2** / **S0.12**
- DEPRESSED SLAB - SEE **7D** / **S0.12** UNO
- GB1 — GRADE BEAM - SEE **4** / **S5.22**

1ST FLOOR FOUNDATION PLAN - SEGMENT A — SCALE: 1/8" = 1'-0" — **1**

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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	2.11.2022

KEYNOTES

NOTES

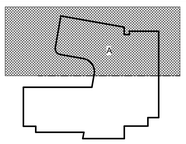
CONSULTANT

saiful•bouquet structural engineers
155 North Lake Avenue, 6th Floor
Pasadena, CA 91101
Telephone 626.304.2616
www.saifulbouquet.com

SB Job No:20505

REGISTERED PROFESSIONAL ENGINEER — M. SAIFUL BOUQUET — No. 4083 — EXP. 06/30/22 — STRUCTURAL — STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

1ST FLOOR FOUNDATION - SEGMENT A

ADDENDUM #2

FILE NO.: **36-C1** — A# : **04-119722**

DATE: **06.17.2021** — CLIENT PROJ NO:

SHEET:

S2.10A

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH AT FULL SHEETS ORIGINAL PAPER SIZE

FOUNDATION PLAN NOTES

1. FOR GENERAL NOTES SEE **S0.X** SERIES SHEETS. TYPICAL DETAILS OCCUR THROUGHOUT THESE STRUCT DWGS IN ADDITION TO THOSE ON **S2.X** SERIES SHEETS.
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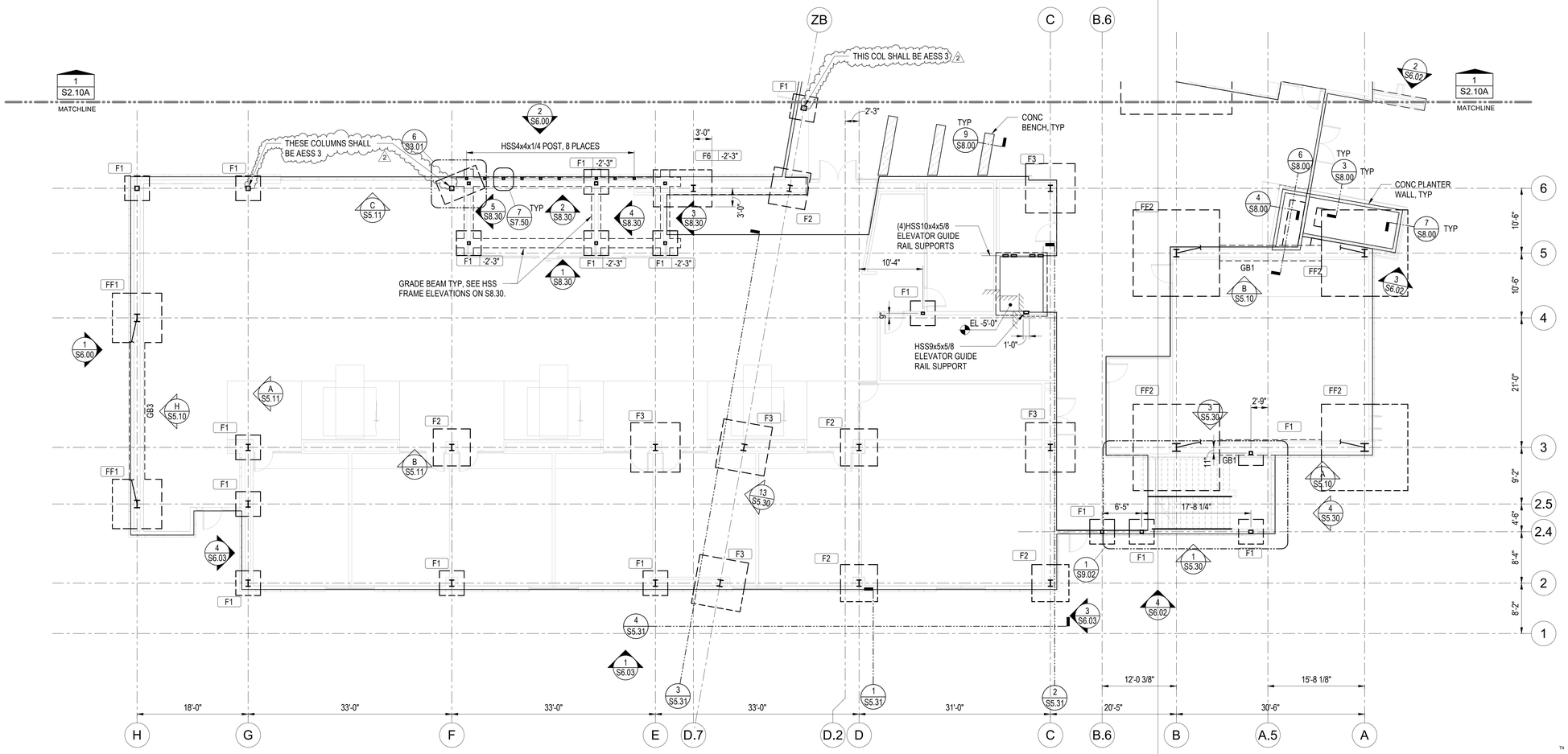
- MECH PAD - SEE **2** / **S0.12**
- DEPRESSED SLAB - SEE **7D** / **S0.12** UNO
- GB1 — GRADE BEAM - SEE **4** / **S5.22**



1ST FLOOR FOUNDATION PLAN - SEGMENT B

SCALE: 1/8" = 1'-0"

1

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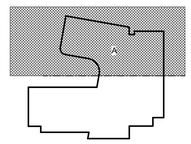
Pasadena, CA 91101
Telephone 626.304.2616
www.saifulbouquet.com
SB Job No:20505

REGISTERED PROFESSIONAL ENGINEER — S. U. L. — No. S 4083 — Exp. 06/30/22 — STRUCTURAL — STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

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5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

1ST FLOOR FOUNDATION - SEGMENT B

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

SHEET:

S2.10B

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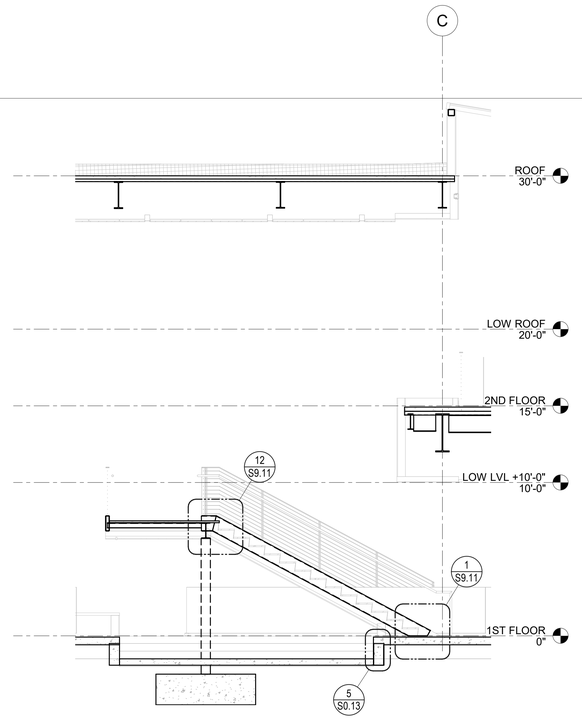
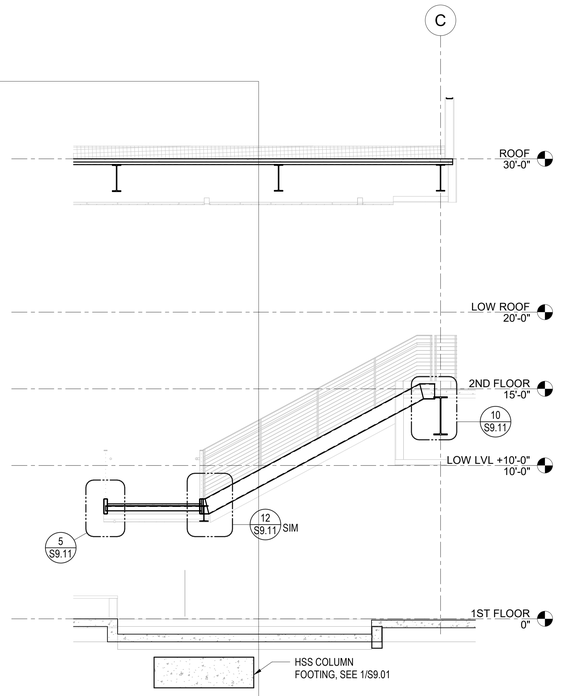


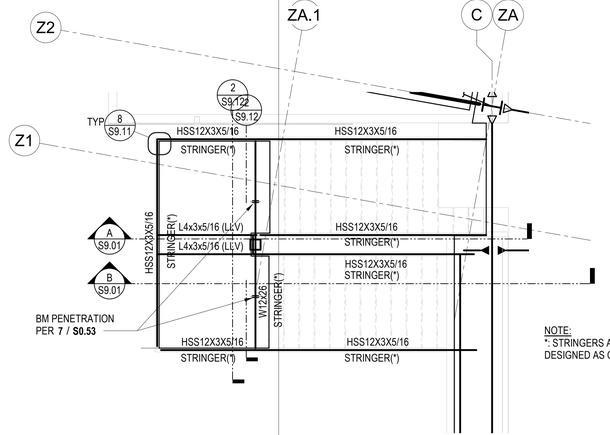
SECTION B
SCALE: 1/4" = 1'-0"



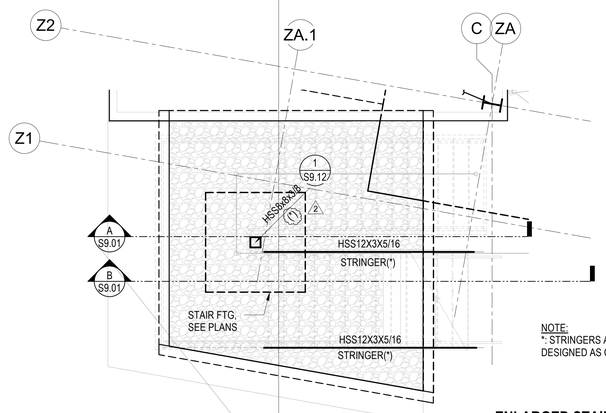
SECTION A
SCALE: 1/4" = 1'-0"

NOTES:
1. SEE **S2.10A** AND **S2.20A** FOR NOTES... 2
2. ALL STEEL NOTED WITH THE SYMBOL (*) SHALL BE AESS 3 2
3. ALL STAIR LANDING SHALL BE 3" NORMAL WEIGHT CONCRETE WITH 4X4/W2.0XW2.0 WWF AT SLAB CENTERLINE, TYP

STAIR PLAN FRAMING NOTES



ENLARGED STAIR 1 2ND FLOOR FRAMING PLAN
SCALE: 1/4" = 1'-0"



ENLARGED STAIR 1 FOUNDATION PLAN
SCALE: 1/4" = 1'-0"

AGENCY APPROVAL:

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SB Job No:20505

REGISTERED PROFESSIONAL ENGINEER SAIFUL BOUQUET No. 4083 EXP. 06/30/22 STRUCTURAL STATE OF CALIFORNIA

FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ENLARGED STAIR-1 PLANS AND SECTIONS

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

SHEET:

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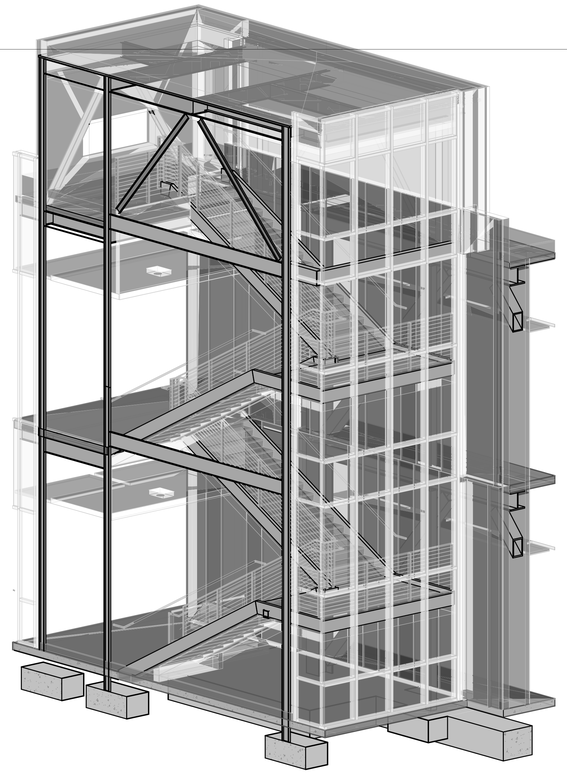

NOTES:
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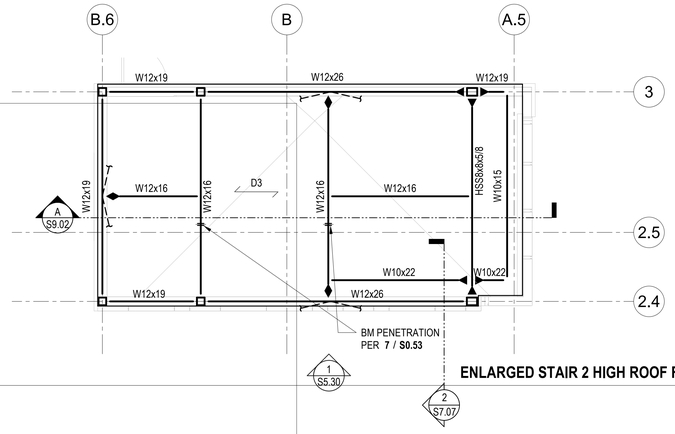
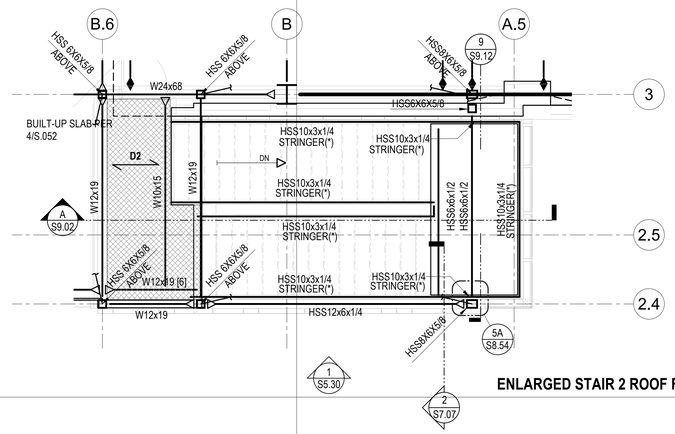
STAIR PLAN FRAMING NOTES

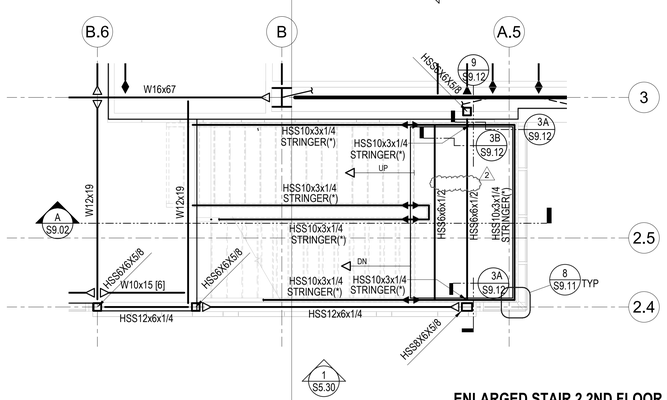
SECTION **A**
SCALE: 1/4" = 1'-0"



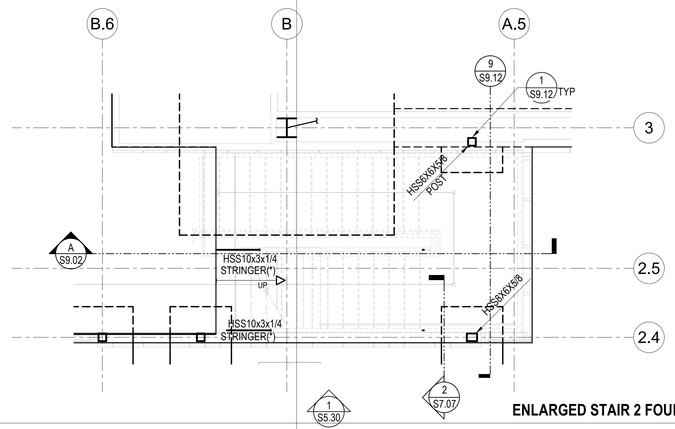
ENLARGED STAIR 2 HIGH ROOF FRAMING PLAN **4**
SCALE: 1/4" = 1'-0"



ENLARGED STAIR 2 ROOF FRAMING PLAN **3**
SCALE: 1/4" = 1'-0"



ENLARGED STAIR 2 2ND FLOOR FRAMING PLAN **2**
SCALE: 1/4" = 1'-0"



ENLARGED STAIR 2 FOUNDATION PLAN **1**
SCALE: 1/4" = 1'-0"

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FACILITY:

CHAFFEY COLLEGE - CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ENLARGED STAIR-2 PLANS AND SECTIONS

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

SHEET:

S9.02

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PLUMBING LEGEND

PIPE & ACCESSORIES (PLANS)

- POINT OF CONNECTION
- POINT OF DISCONNECTION
- DEMOLITION OF PIPING, DEVICES, ETC.
- END OF DEMOLITION WORK
- FLOOR DRAIN
- FLOOR SINK
- COMBINATION ROOF / OVERFLOW DRAIN
- ROOF DRAIN / AREA DRAIN
- ROOF RECEPTOR
- FLOOR CLEANOUT
- WALL CLEANOUT
- HOSE BIBB
- LINE BREAK
- PIPE CAP
- END OF PIPE
- TEMPERATURE SENSOR
- FLEX CONNECTION
- UNION
- FLANGE
- FLOW DIRECTION
- DWV FITTING, 45° ELBOW
- DWV FITTING, 90° ELBOW
- DWV FITTING, 45° TEE
- DWV FITTING, 90° TEE
- PIPE DROP
- PIPE BRANCH, TEE UP
- PIPE BRANCH, TEE DOWN
- REVISION CLOUD AND DELTA
- XX / XX — EQUIPMENT TYPE / NUMBER TYPE
- X / PX.XX — DETAIL DESIGNATION / SHEET NUMBER

VALVES & ACCESSORIES (DIAGRAMS)

- PRESSURE REDUCING VALVE
- PRESSURE REDUCING VALVE GAS
- PRESSURE REDUCING VALVE - LINE FEED
- M — 2-WAY CONTROL VALVE, 2-POS
- M — 3-WAY CONTROL VALVE, 2-POS
- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- CIRCUIT SETTER/BALANCING VALVE
- FLOAT VALVE
- T&P RELIEF VALVE
- THERMOSTATIC MIXING VALVE
- SHUTOFF VALVE
- GLOBE VALVE
- WYE STRAINER
- WYE STRAINER WITH BLOW OFF
- GATE VALVE
- MANUAL AIR VENT
- PLUG VALVE
- S — SOLENOID CONTROL VALVE, 2-POS
- T — TEMP GUAGE
- P — PRESSURE GUAGE
- THERMOMETER
- VACUUM BREAKER
- VFD — VARIABLE FREQUENCY DRIVE
- REDUCER
- CEILING ACCESS PANEL (AP)
- WALL MOUNTED ACCESS PANEL (AP)

EQUIPMENT & ACCESSORIES (DIAGRAMS)

- EXPANSION TANK
- HEAT EXCHANGER
- PUMP
- FLOOR DRAIN (FD-X)
- OVERFLOW DRAIN (ODX)
- ROOF DRAIN (RD-X)
- PLANTER GARAGE DRAIN (PD-X / GD-X)
- PLUMBING WATER CLOSET (WC-X)
- LAVATORY (LAV-X)
- END OF PIPE - CLEANOUT
- END OF PIPE - FLOOR CLEANOUT
- END OF PIPE - WALL CLEANOUT
- 2 WAY CLEANOUT CLEANOUT
- VTR (VENT THRU ROOF)
- WHA — WATER HAMMER ARRESTOR
- TP — TRAP PRIMER
- WM-XX — WATER METER
- BFP-XX — BACKFLOW PREVENTER

PIPE LINE DESIGNATIONS

CW	DOMESTIC COLD WATER
HW	DOMESTIC HOT WATER SUPPLY
HWR	DOMESTIC HOT WATER RETURN
SAN	SANITARY SEWER
SAN	SANITARY SEWER (UNDERFLOOR)
V	SANITARY VENT
G	NATURAL GAS (LOW PRESSURE)
MG	NATURAL GAS (MEDIUM PRESSURE)
TP	TRAP PRIMER WATER
CD	CONDENSATE DRAIN
FW	FIRE PROTECTION WATER
RW	RECLAIMED WATER
SD	STORM DRAIN
OD	OVERFLOW DRAIN
FO	FUEL OIL

PIPE LINE DESIGNATIONS (LAB)

ICW	INDUSTRIAL COLD WATER
IHW	INDUSTRIAL HOT WATER
IHWR	INDUSTRIAL HOT WATER RETURN
LW	LAB WASTE
LV	LAB VENT
DIS	DEIONIZED WATER SUPPLY
DIR	DEIONIZED WATER RETURN
N2	NITROGEN
O2	OXYGEN
CO2	CARBON DIOXIDE
CA	COMPRESSED AIR (100 PSIG)
CONT	CONTAINMENT PIPING
LA	LAB AIR (15 PSIG)
RO	REVERSE OSMOSIS WATER SUPPLY
PW	PURIFIED WATER SUPPLY
VAC	VACUUM PIPING

FIRE PROTECTION LEGEND

FW	FIRE WATER SUPPLY
SP	WET SPRINKLER PIPING
DSP	DRY STANDPIPE
CSP	COMBINATION SPRINKLER /STANDPIPE
WSP	WET STAND PIPE
FHV	FIRE HOSE VALVE
FDC	FIRE DEPARTMENT CONNECTION
PIV	POST INDICATING VALVE
SPD	SPRINKLER DRAIN

CALIFORNIA CODES AND STANDARDS

1. 2019 CALIFORNIA ADMINISTRATIVE CODE, PART 1, TITLE 24 C.C.R.
2. 2019 CALIFORNIA ADMINISTRATIVE CODE, PART 2, TITLE 24 C.C.R.
   A. (2018 INTERNATIONAL BUILDING CODE VOLUMES 1 & 2 AND 2019 CALIFORNIA AMENDMENTS)
3. 2019 CALIFORNIA ELECTRICAL CODE (CEC), PART 3, TITLE 24 C.C.R.
   A. (2017 NATIONAL ELECTRICAL CODE AND 2019 CALIFORNIA AMENDMENTS)
4. 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 4, TITLE 24 C.C.R.
   A. (2018 IAPMO UNIFORM MECHANICAL CODE AND 2019 CALIFORNIA AMENDMENTES)
5. 2019 CALIFORNIA PLUMBING CODE (CPC) PART 5, TITLE 24 C.C.R.
   A. (2018 IAPMO UNIFORM PLUMBING CODE AND 2019 CALIFORNIA AMENDMENTS)
6. 2019 CALIFORNIA ENERGY CODE (CEC), PART 6, TITLE 24 C.C.R.
7. 2019 CALIFORNIA FIRE CODE, PART 9, TITLE 24 C.C.R.
   A. (2018 INTERNATIONAL FIRE CODE AND 2019 CALIFORNIA AMENDMENTS)
8. 2019 CALIFORNIA EXISTING BUILDING CODE (CEBC), PART 10, TITLE 24 C.C.R.
   A. (2018 INTERNATIONAL EXISTING BUILDING CODE AND 2019 CALIFORNIA AMENDMENTS)
9. 2019 CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGREEN), PART 11, TITLE 24 C.C.R.
10. 2019 CALIFORNIA REFERENCED STANDARDS CODE, PART 12, TITLE 24 C.C.R.
11. TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS.
12. 2016 ASME A17.1/CSA B44-13 SAFETY CODE FOR ELEVATORS AND ESCALATORS

MEP COMPONENT ANCHORAGE NOTE

ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS. THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2019 CBC, SECTIONS 1617A.1.18 THROUGH 1617A.1.26 AND ASCE 7-16 CHAPTER 13, 26, AND 30:

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G. HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS, OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTIONS EXEPT PLUGS FOR 110/220 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.
3. TEMPORARY, MOVEABLE OR MOBILE EQUIPMENT WHICH IS HEAVIER THAN 400 POUNDS OR HAS A CENTER OF MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT IS REQUIRED TO BE RESTRAINED IN A MANNER APPROVED BY DSA.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE, BUT NEED NOT DEMONSTRATE DESIGN COMPLIANCE WITH THE REFERENCES NOTED ABOVE. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIETED DUCTWORK, PIPING, AND CONDUIT. FLEXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTIONS:

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
B. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR HUNG FROM A WALL.

THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SHALL BE SUBJECT TO THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR STRUCTURAL ENGINEER DELEGATED RESPONSIBILITY AND ACCEPTANCE BY DSA. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH THE ABOVE REQUIREMENTS.

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEM BRACING
PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7-16 SECTION 13.3 AS DEFINED IN ASCE 7-16 SECTION 13.6.5, 13.6.6, 13.6.7, 13.6.8, AND 2019 CBC, SECTIONS 1617A.1.24, 1617A.1.25, AND 1617A.1.26.

THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR IDENTIFIED DISTRUBITON SYSTEM ARE AS NOTED BELOW. WHEN BRACING AND ATTACHMENTS ARE BASED ON A PREAPPROVED INSTALLATION GUIDE (E.G. OSHPD OPM FOR 2013 CBC OR LATER), COPIES OF THE BRACING SYSTEM INSTALLATION GUIDE OR MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF AND DURING THE HANGING AND BRACING OF THE DISTRUBITON SYSTEMS. THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.

MECHANICAL PIPING (MP), MECHANICAL DUCTS(MD), AND PLUMBING PIPING (PP), ELECTRICAL DISTRUBTION SYSTEMS (E):

MP ☐ MD ☐ PP ☐ E ☐ — OPTION 1: DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS

MP ■ MD ■ PP ■ E ■ — OPTION 2: SHALL COMPLY WITH THE APPLICABLE OSHPD PRE-APPROVAL OPM-0052-13, OPM-0043-13, OPM-0203-13.

PLUMBING ABBREVIATIONS

ABV	ABOVE
AC	ALTERNATING CURRENT
ACU	AIR-CONDITIONING UNIT(S)
AD	ACCESS DOOR
ADA	AMERICAN WITH DISABILITY ACT
ADAAG	ADA AMERICANS ACCESSIBILITY GUIDELINES
ADDL	ADDITIONAL
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AG	ABOVE THE GROUND
AGA	AMERICAN GAS ASSOCIATION
AHU	AIR-HANDLING UNIT
AIR COND	AIR CONDITION(-ING, -ED)
AISI	AMERICAN IRON AND STEEL INSTITUTE
ALT	ALTERNATE
AMB	AMBIENT
AMP	AMPERE (AMP, AMPS)
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AP	ACCESS PANEL
ARCH	ARCHITECT, ARCHITECTURAL
ARF	ABOVE RAISED FLOOR
ASC	ABOVE SUSPENDED CEILING
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR CONDITIONING ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASPE	AMERICAN SOCIETY OF PLUMBING ENGINEERS
ASSE	AMERICAN SOCIETY OF SANITARY ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
ATM	ATMOSPHERE
AV	ACID VENT
AW	ACID WASTE
AWG	AMERICAN WIRE GAUGE
AWS	AMERICAN WELDING SOCIETY
AWWA	AMERICAN WATER WORKS ASSOCIATION
B&S	BELL AND SPIGOT
BEL	BELOW
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BLDG	BUILDING
BLR	BOILER
BM	BEAM
BOD	BOTTOM OF DUCT
BOM	BILL OF MATERIAL
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BRF	BELOW RAISED FLOOR
BSMT	BASEMENT
BT	BATHTUB
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNITS PER HOUR
BV	BUTTERFLY VALVE
BWV	BACK WATER VALVE
C	DEGREES CELSIUS
CA	COMPRESSED AIR
CAB	CABINET
CAP	CAPACITY
CB	CATCH BASIN
CCT	CIRCUIT
CD	CONDENSATE DRAIN
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CISP	CAST IRON SOIL/SEWER PIPE
CISPI	CAST IRON SOIL PIPE INSTITUTE
CL	CENTERLINE
CLG	CEILING
CMU	CONCRETE MASONRY UNIT
CNTR	CENTER
CO	CLEANOUT
COEF	COEFFICIENT
COL	COLUMN
COM	COMMON
CONC	CONCRETE
CONN	CONNECTION
COND	CONDENS(-ER, -ING, -ATION)
CONST	CONSTRUCTION
CONTR	CONTRACTOR
CP	CIRCULATING PUMP
CS	CAST STEEL
CTR	CENTER
CU	COPPER (CHEMICAL ABBREVIATION)
CU FT	CUBIC FEET
CU IN	CUBIC INCH
CV	CHECK VALVE
CW	COLD WATER
DBL	DOUBLE
DC	DIRECT CURRENT
DCV	DETECTOR CHECK VALVE
DEG	DEGREE
DEMO	DEMOLITION
DEPT	DEPARTMENT
DET	DETAIL
DF	DRINKING FOUNTAIN
DFU	DRAINAGE FIXTURE UNIT
DI	DEIONIZED WATER
DIA	DIAMETER
DIM	DIMENSION
DN	DOWN
DP	DEPTH OR DEEP
DS	DOWNSPOUT
DSP	DRY STANDPIPE
DW	DISTILLED WATER
DWG	DRAWING
DWV	DRAIN, WASTE AND VENT
E	EXISTING
EA	EACH
EFF	EFFICIENCY
ELEC	ELECTRICAL
EMER	EMERGENCY
ENCL	ENCLOSURE
ENG	ENGINEER
ENT	ENTRANCE
EQ	EQUAL
ESS	EMERGENCY SAFETY SHOWER
EEW	EMERGENCY EYEWASH
ESEW	EMERGENCY SHOWER / EYEWASH
EST	ESTIMATE
EVAP	EVAPORAT(-E, -ING, -ED, -OR)
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EWT	ENTERING WATER TEMPERATURE
EXP	EXPOSED
EXT	EXTINGUISH
F	FAHRENHEIT
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FDTH	FIRE DEPARTMENT TEST HEADER
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FINISHED FLOOR
FFE	FINISHED FLOOR ELEVATION
FG	FINISH GRADE
FH	FIRE HOSE
FHC	FIRE HOSE CABINET
FHR	FIRE HOSE RACK
FHS	FIRE HOSE STATION
FHY	FIRE HYDRANT
FIXT	FIXTURE
FLR	FLOOR
FND	FOUNDATION
FP	FIRE PROTECTION MAIN
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FR	FIRE RISER
FS	FLOOR SINK
FT	FEET
FU	FIXTURE UNIT
FURN	FURNISH
FUT	FUTURE
FVC	FIRE VALVE CABINET
FW	FIRE WATER

G	NATURAL GAS
GA	GAGE OR GAUGE
GAL	GALLON
GC	GENERAL CONTRACTOR
GCO	GRADE CLEANOUT
GD	GARAGE DRAIN
GI	GREASE INTERCEPTOR
GND	GROUND
GOVT	GOVERNMENT
GP	GALVANIZED PIPE
GPD	GALLONS PER DAY
GPF	GALLONS PER FLUSH
GPM	GALLONS PER MINUTE
GPH	GALLONS PER HOUR
GPS	GALLONS PER SECOND
GV	GALVANIZED
GVA	GATE VALVE
GWH	GAS WATER HEATER
GW	GREASE WASTE
GWW	GRAY WATER WASTE
H	HIGH
HB	HOSE BIB /HYDRANT
HD	HUB DRAIN
HDR	HEADER
HOR	HORIZONTAL
HP	HORSE POWER
HR/HRS	HOUR(S)
HT	HEIGHT
HTG	HEATING
HTR	HEATER
HVAC	HEATING, VENTILATION & AIR CONDITIONING
HW	HOT WATER
HWR	HOT WATER RETURN
HZ	HERTZ (CYCLES PER SECOND)
I	IRON
ICW	INDUSTRIAL COLD WATER
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IHW	INDUSTRIAL HOT WATER
IHWR	INDUSTRIAL HOT WATER RETURN
INC	INCREASER, INCREASING
IN	INCH
INCL	INCLUDE
INFO	INFORMATION
INS	INSULATION
INSP	INSPECT
INSUL	INSULATION
INT	INTERIOR, INTERNAL
INV	INVERT
IP	IRON PIPE
IPS	IRON PIPE SIZE
IW	INDIRECT WASTE
IWH	INSTANTANEOUS WATER HEATER
J-BOX	JUNCTION BOX
JC	JANITOR'S CLOSET
KF	KITCHEN FIXTURE
KW	KILOWATT
KWH	KILOWATT HOUR
KVA	KILOVOLT-AMPERE
KW	KILOWATT
L	LENGTH
LAB	LABORATORY
LAT	LATERAL
LAV	LAVATORY
LBS	POUNDS
LD	LEAK DETECTION
LF	LINEAR FEET
LG	LENGTH
LH	LEFT HAND
LPD	LOW POINT DRAIN
LW	LAB WASTE
LV	LAB VENT
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
ME	MECHANICAL ENGINEER
MECH	MECHANICAL
MFR	MANUFACTURER
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MS	MOP SINK
MTR	MOTOR
MWP	MAXIMUM WORKING PRESSURE
N	NITROGEN
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NFWH	NON-FREEZE WALL HYDRANT
NOM	NOMINAL
NRS	NON RISING STEAM VALVE
N/A	NOT APPLICABLE
NBS	NATIONAL BUREAU OF STANDARDS
NC	NOISE CRITERIA
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIS	NOT IN SCOPE
NO, #	NUMBER
NPS	NOMINAL PIPE SIZE (ALSO CALLED IPS)
NPSHR	NET POSITIVE SUCTION HEAD REQUIRED
NTS	NOT TO SCALE
O	OXYGEN
OC	ON CENTER
ODIA	OUTSIDE DIAMETER
OD	OVERFLOW DRAIN
OSD	OPEN SIGHT DRAIN
OS&Y	OUTSIDE SCREW & YOKE (VALVE)
OUT	OUTLET
OZ	OUNCE
P	PITCH
PB	LEAD (CHEMICAL ABBREVIATION)
PD	PLAZA DRAIN, PRESSURE DROP, OR PRESSURE DIFFERENCIAL
PDI	PLUMBING DRAINAGE INSTITUTE
PE	PROFESSIONAL ENGINEER
PERIM	PERIMETER
PG	PRESSURE GAUGE
PH	PHASE (ELECTRICAL)
PIV	POST INDICATOR VALVE
PL	PROPERTY LINE
PLBG	PLUMBING
POC	POINT OF CONNECTION
PPM	PARTS PER MILLION
PRESS	PRESSURE
PRIM	PRIMARY
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAUGE
PVC	POLYVINYL CHLORIDE
PWS	PURE WATER SUPPLY
PWR	PURE WATER RETURN
PWR	POWER
QT	QUART
QTY	QUANTITY
R	HYDRAULIC RADIUS
RAD	RADIUS
RCP	REFLECTED CEILING PLAN
RCVR	RECEIVER
RD	ROOF DRAIN
RECIRC	RECIRCULATE
REF	REFERENCE
REQD	REQUIRED
RET	RETURN
REV	REVISION
RF	ROOF
RH	RIGHT HAND
RL	ROOF LEADER
RM	ROOM
RO	REVERSE OSMOSIS
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
RPM	REVOLUTIONS PER MINUTE
RW	RAW WATER /RECLAIMED WATER /RECYCLED WATER
RWC	RAIN WATER CONDUCTOR
RWL	RAIN WATER LEADER

SAD	SEE ARCHITECTURAL DRAWING(S)
SAN	SANITARY
SB	SPLASH BLOCK
SCD	SEE CIVIL DRAWING(S)
SCFM	CUBIC FT PER MINUTE, STANDARD CONDITIONS
SCFS	CUBIC FT PER SEC, STANDARD CONDITIONS
SCH	SCHEDULE
SCUP	SCUPPER
SD	STORM DRAIN
SE	SEWAGE EJECTOR
SEC	SECOND
SECT	SECTION
SERV	SERVICE
SEV	SEWAGE EJECTOR VENT
SF	SQUARE FOOT
SH	SHOWER
SHT	SHEET
SIM	SIMILAR
SK	SINK
SLV	SLEEVE
SLD	SEE LANDSCAPE ARCHITECT DRAWING(S)
SMD	SEE MECHANICAL DRAWING(S)
SSD	SEE STRUCTURAL DRAWING(S)
SOV	SHUTOFF VALVE
STP	STANDPIPE
SP	STATIC PRESSURE /SPRINKLER /SUMP PUMP
SPEC	SPECIFICATION
SPD	SUMP PUMP DISCHARGE
SPM	SPRINKLER MAIN
SS	SERVICE SINK
STD	STANDARD
STL	STEEL
SUCT	SUCTION
SRV	SAFETY RELIEF VALVE
SQ	SQUARE
SQ FT	SQUARE FEET
S&W	SOIL & WASTE
T	TEE
T&P	TEMPERATURE & PRESSURE RELIEF VALVE
TD	TRENCH DRAIN
TEMP	TEMPERATURE
TLT	TOILET
TW	TEMPERED WATER
TWR	TEMPERED WATER RETURN
TYP	TYPICAL
TAP	TAP, TAPPED
TOT	TAP ON TOP
TP	TRAP SEAL PRIMER
TY	TEE WYE, (SAN TEE)
TYP	TYPICAL
UP	PIPE UP THRU FLOOR SLAB
UR	URINAL
UON	UNLESS OTHERWISE NOTED
V	VENT
VAP	VACUUM PUMP
VT	VOLT
VOL	VOLUME
VAC	VACUUM
VAR	VARIABLE
VB	VALVE BOX
VEL	VELOCITY
VERT	VERTICAL
VLV	VALVE
VOL	VOLUME
VP	VENT PIPE
VS	VENT STACK
VTR	VENT THROUGH ROOF
W	WASTE /WATT
W/	WITH
W/O	WITHOUT
WC	WATER CLOSET
WCO	WALL CLEANOUT
WFS	WATER FLOW SWITCH
WH	WATER HEATER /WALL HYDRANT
WM	WATER METER
WS	WATER STOP
WHA	WATER HAMMER ARRESTOR
WL	WATER LEVEL
WP	WEATHERPROOF
WSFU	WATER SUPPLY FIXTURE UNIT
WT	WEIGHT
%	PERCENT
(E)	EXISTING
(N)	NEW
@	AT (THE RATE OF)
&	AND
#	NUMBER

01 SHEET LIST - PLUMBING

NUMBER	NAME
P0.01	PLUMBING LEGEND, ABBREVIATIONS, AND GENERAL NOTES
P0.02	PLUMBING SCHEDULES AND CALCULATIONS
P1.11	PLUMBING SITE PLAN
P2.01	PLUMBING PLAN - UNDERGROUND - OVERALL
P2.01A	PLUMBING PLAN - UNDERGROUND - SEGMENT A
P2.01B	PLUMBING PLAN - UNDERGROUND - SEGMENT B
P2.11	PLUMBING PLAN - FIRST FLOOR - OVERALL
P2.11A	PLUMBING PLAN - FIRST FLOOR - SEGMENT A
P2.11B	PLUMBING PLAN - FIRST FLOOR - SEGMENT B
P2.21	PLUMBING PLAN - SECOND FLOOR - OVERALL
P2.21A	PLUMBING PLAN - SECOND FLOOR - SEGMENT A
P2.21B	PLUMBING PLAN - SECOND FLOOR - SEGMENT B
P3.00	PLUMBING ENLARGED PLANS
P4.11	PLUMBING ROOF PLAN - OVERALL
P4.11A	PLUMBING ROOF PLAN - SEGMENT A
P4.11B	PLUMBING ROOF PLAN - SEGMENT B
P5.10	DOMESTIC HOT & COLD WATER ISOMETRIC
P5.11	DOMESTIC HOT & COLD WATER ISOMETRIC
P5.20	SANITARY WASTE AND VENT ISOMETRIC
P5.21	SANITARY WASTE AND VENT ISOMETRIC
P5.30	STORM DRAINAGE ISOMETRIC
P6.00	PLUMBING DETAILS
P6.01	PLUMBING DETAILS
P6.02	PLUMBING DETAILS

PLUMBING GENERAL NOTES

1. PROVIDE COMPLETE AND FULLY FUNCTIONAL PLUMBING SYSTEMS AS INDICATED IN THE CONTRACT DOCUMENTS. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE CALIFORNIA PLUMBING CODE, CALIFORNIA MECHANICAL CODE, CALIFORNIA BUILDING CODE AND LOCAL RULES AND REGULATIONS, STATE AND LOCAL FIRE MARSHAL REGULATIONS, THE SAFETY ORDERS OF THE DIVISION OF INDUSTRIAL SAFETY, THE NATIONAL ELECTRIC CODE, THE STANDARDS OF THE NATIONAL FIRE PROTECTION ASSOCIATION, AMERICAN GAS ASSOCIATION, OCCUPATION AND SAFETY ACT, AMERICAN NATIONAL STANDARDS INSTITUTE, AMERICAN SOCIETY OF MECHANICAL ENGINEERS, AMERICAN SOCIETY FOR TESTING AND MATERIALS, INSTALLATION STANDARDS PUBLISHED BY THE INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS (IAPMO) AND OTHER APPLICABLE LAWS, CODES, OR REGULATIONS. NOTHING IN THESE CONTRACT DOCUMENTS SHALL BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES.
2. VERIFY LOCATION OF UTILITIES PRIOR TO PERFORMING WORK. COORDINATE ALL WORK WITH OTHER TRADES.
3. PLUMBING FIXTURES SHALL HAVE MAXIMUM FLOW RATES AS INDICATED ON SCHEDULES.
4. SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS, MOUNTING HEIGHTS AND COLOR OF PLUMBING FIXTURES.
5. COORDINATE ALL CORING OF FLOORS AND WALLS WITH ARCHITECT PRIOR TO START OF WORK.
6. BEFORE FABRICATION OR INSTALLATION, THE CONTRACTOR SHALL VERIFY EXACT LOCATIONS OF ALL MECHANICAL EQUIPMENT. EXACT ROUGH-IN LOCATIONS AND REQUIREMENTS SHALL BE COORDINATED IN FIELD.
7. PIPING SHALL HAVE SUFFICIENT CLEARANCE FROM STRUCTURE TO ALLOW FOR EXPANSION AND CONTRACTION OF THE PIPING. NO PIPING SHALL TOUCH WOOD, CONCRETE, OTHER PIPING, ETC.
8. ALL EQUIPMENT, FIXTURES, ETC. SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS.
9. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, AND EQUIPMENT NECESSARY AND PERFORM ALL REQUIRED TESTING OF ALL PIPING AND ACCESSORIES INSTALLED. ALL SUCH PLUMBING INSTALLATIONS SHALL BE TESTED, REPAIRED, AND ADJUSTED TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE AND ALL GOVERNING AUTHORITIES.
10. ALL VALVES, UNIONS, ETC. SHALL BE SAME SIZE AS LINE SIZE UNLESS OTHERWISE NOTED ON DRAWINGS.
11. PROVIDE UNIONS AFTER EACH THREADED VALVE AND PRIOR TO EQUIPMENT CONNECTIONS.
12. FOLLOW THE GENERAL ARRANGEMENT INDICATED ON THE DRAWINGS AS CLOSELY AS POSSIBLE, THE CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, ELECTRICAL AND ALL OTHER TRADES PRIOR TO INSTALLATION OF THE MATERIALS AND EQUIPMENT TO VERIFY ADEQUATE SPACE AVAILABLE FOR INSTALLATION OF THE WORK SHOWN. THE ARCHITECT AND ENGINEER SHALL BE IMMEDIATELY NOTIFIED IF AN AREA OF CONFLICT OCCURS BETWEEN TRADES.
13. SPECIFICATIONS ARE AN INTEGRAL PART OF THIS PROJECT. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH SPECIFICATION REQUIREMENTS.
14. ALL FIXTURES, FLOOR DRAINS, FLOOR SINKS, ETC. SHALL BE TRAPPED AND VENTED. PROVIDE TRAP PRIMER TO ALL FLOOR DRAINS, FLOOR SINKS, HUB DRAINS AND AS INDICATED ON THE DRAWINGS. ALL TRAP PRIMERS SHALL BE ACCESSIBLE AND PROVIDED WITH A 12"X12" ACCESS PANEL (MINIMUM).
15. 2 NOT USED
16. PROVIDE ALL PIPING, VALVES, FITTINGS AND OTHER APPURTENANCES FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.
17. PIPING TO BE SLOPED AS FOLLOWS UNLESS OTHERWISE NOTED:
    A. SANITARY SEWER = 2%
    B. SANITARY VENT (BELOW FLOOD RIM) = 0%
    C. SANITARY VENT (ABOVE FLOOD RIM) = 0.25%
    D. TRAP PRIMER = 1%
    E. CONDENSATE = 1%
    F. STORM DRAIN = 1%
18. VERIFY IN FIELD EXISTING CONDITIONS, SIZE AND EXACT LOCATION OF SERVICES PRIOR TO START OF WORK.
19. THE CONSTRUCTION DOCUMENTS FOR THIS PROJECT WERE PREPARED BY THE DESIGN TEAM USING 3-D MODELING SOFTWARE. USING THIS SOFTWARE BY THE DESIGN TEAM DOES NOT RELIEVE THE CONTRACTOR FROM PERFORMING THE NECESSARY COORDINATION TO PROVIDE COMPLETE, CODE COMPLIANT AND OPERATIONAL BUILDING SYSTEMS. THE PLANS AND SECTIONS PROVIDED ARE NOT COMPLETE AND ARE TO BE CONSIDERED DIAGRAMMATIC ONLY. THE EXACT LOCATION OF THE PIPING, DUCTWORK, ELECTRICAL AND SUPPORT COMPONENTS ARE TO BE DETERMINED IN THE FIELD. ALL BUILDING SECTIONS AND DETAILS PROVIDED ARE FOR INFORMATION ONLY AND DO NOT RELIEVE THE CONTRACTOR FROM PERFORMING FINAL COORDINATION. CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH ALL OTHER TRADES.
20. SUBMIT FOR APPROVAL MANUFACTURER'S SUBMITTAL DATA ON ALL MATERIALS, EQUIPMENT, AND DEVICES PER SPECIFICATIONS

FIRE PROTECTION GENERAL NOTES:

1. REFER TO SPECIFICATIONS FOR MATERIALS, METHODS OF CONSTRUCTION AND ADDITIONAL INFORMATION.
2. WORK INCLUDES DESIGN AND INSTALLATION OF A COMPLETE FIRE PROTECTION SYSTEM FOR THE FACILITY BASED ON A DESIGN BUILD BASIS. CONTRACTION IS RESPONSIBLE FOR ALL WORK, INCLUDING SHOP DRAWINGS PREPARATION, NECESSARY FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.
3. PERFORM ALL DESIGN AND INSTALLATION WORK IN ACCORDANCE WITH THE LATEST ADOPTED EDITION OF NFPA, ALL GOVERNING BUILDING CODES, REGULATIONS, ORDINANCES AND AGENCIES, DRAWINGS AND SPECIFICATIONS.
4. SUBMIT COMPLETE FIRE PROTECTION SYSTEM AND FIRE & LIFE SAFETY PLAN CHECK DOCUMENTS FOR REVIEW AND APPROVAL BY LOCAL FIRE MARSHAL, OR AHJ PRIOR TO INSTALLATION.
5. PROVIDE CALIFORNIA LICENSED FIRE PROTECTION ENGINEER'S STAMP, OR CONTRACTOR'S C-16 LICENSE ON FIRE PROTECTION PLAN(S) FOR DSA AND FIRE MARSHAL REVIEW AND APPROVAL.
6. ALL COST FOR INSPECTION, TEST SERVICES, BUILDING PERMITS, LICENSES AND CERTIFICATES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR UNLESS NOTED OTHERWISE IN THE SPECIFICATIONS.
7. PROVIDE HANGERS AND SWAY BRACING AS REQUIRED PER THE LATEST ADOPTED EDITION OF NFPA 13, SPECIFICATION AND LOCAL CODES AND ORDINANCES.
8. ELEVATIONS OF PIPING AND POINTS OF CONNECTION ABOVE AND BELOW GROUND SHALL BE VERIFIED BY FIELD MEASUREMENT PRIOR TO THE START OF INSTALLATION.
9. COORDINATE THE LOCATION OF RISERS, PIPING AND OTHER SPRINKLER SYSTEMS COMPONENTS WITH ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL TRADES.
10. COORDINATE INSTALLATION OF ALL EQUIPMENT AND PIPING WITH OTHER TRADES PRIOR TO INSTALLATION. CONTRACTOR SHALL COORDINATE EXACT LOCATION OF ACCESS PANELS AND SPRINKLER HEADS PRIOR TO INSTALLATION.
11. AVOID PENETRATION OF SOUND-RATED FLOORS AND WALLS WHENEVER POSSIBLE. IF PENETRATIONS ARE REQUIRED, REFER TO ACOUSTIC CONSULTANT REQUIREMENTS FOR PROPER INSTALLATION.
12. ALL PENETRATIONS OF WALLS, FLOORS AND CEILINGS TO BE SEALED ON BOTH SIDES WITH RATED FIRE STOPPING MATERIALS AND ACOUSTICAL SEALANT IN ORDER TO MAINTAIN THE INTEGRITY OF THE WALL AND AVOID TRANSMISSION OF SOUND. REFER TO ACOUSTIC CONSULTANT CONTRACT DOCUMENTS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
13. CONTRACTOR SHALL OBTAIN HYDRANT FLOW TEST CONDUCTED WITHIN THE LAST SIX (6) MONTHS TO DETERMINE AVAILABLE FLOW AND PRESSURE AT THE SITE.
14. FIRE SPRINKLER SYSTEM SHALL BE HYDRAULICALLY CALCULATED IN ACCORDANCE WITH THE LATEST ADOPTED EDITION OF NFPA 13.
15. FIRE SPRINKLER CONTRACTOR SHALL DETERMINE APPROPRIATE LOCATIONS TO TERMINATE FIRE SPRINKLER DRAINS. DRAIN LOCATIONS SHALL COMPLY WITH ALL CODES AND SHALL BE APPROVED BY THE AUTHORITY HAVING JURISDICTION. FIRE SPRINKLER CONTRACTOR SHALL SHOW DRAIN TERMINATION ON SHOP DRAWINGS. COORDINATE INDIRECT WASTE RECEPTOR LOCATIONS WITH PLUMBING CONTRACTOR TO ACCEPT DRAIN DISCHARGE TERMINATION.
16. SPRINKLER HEADS INSTALLED IN FREEZING CONDITIONS SHALL BE PROTECTED FROM FREEZING.
17. FIRE PROTECTION SYSTEM PIPING AND EQUIPMENT SHALL BE SUPPORTED AND SEISMICALLY BRACED PER CBC, ASCE 7 AND NFPA REQUIREMENTS.

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Δ	DESCRIPTION	DATE
2	ADDENDUM 2	02.11.2022

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

PLUMBING LEGEND, ABBREVIATIONS, AND GENERAL NOTES

ADDENDUM #2

FILE NO.: 36-C1 — A# : 04-119722

DATE: 01.19.2022 — CLIENT PROJ NO:

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PIPE MATERIAL SCHEDULE

PLUMBING SERVICE	MATERIAL	COPPER TYPE 'L', ASTM B88, B32 FITTINGS, ASME B16.18, B16.22, B16.24	COPPER TYPE "M" (SOLDERED)	COPPER TYPE 'K', ASTM B88, B32 FITTINGS, ASME B16.18, B16.22, B16.24	HUBLESS, CAST IRON SOIL PIPE CISPI HUBLESS COUPLINGS WITH NFS CERTIFICATION	HUBLESS, CAST IRON SOIL PIPE, ASTM C564 HEAVY DUTY, SHEILDED STAINLESS STEEL COUPLING	SCHEDULE 40 BLACK STEEL PIPE & FITTINGS	EPOXY-COATED BLACK STEEL SCHEDULE 40 ASTM A53 PIPE & FITTINGS	REMARKS
SANITARY WASTE & VENT	ABOVE GRADE				■				
	BELOW GRADE					■			PROVIDE CORROSION PROTECTION PER ASTM A674 OR AWWA C105
STORM DRAIN	ABOVE GRADE				■				
	BELOW GRADE					■			PROVIDE CORROSION PROTECTION PER ASTM A674 OR AWWA C105
CONDENSATE & INDIRECT DRAIN	ABOVE GRADE		■						
DOMESTIC COLD & HOT WATER	ABOVE GRADE	■							
	BELOW GRADE			■					PROVIDE CORROSION PROTECTION PER ASTM A674 OR AWWA C105
FIRE PROTECTION	ABOVE GRADE						■		
	BELOW GRADE							■	

PLUMBING FIXTURES CALCULATION

Fixture type	No. of fixtures	Fixture Units (DFU)	Total SAN DFU	Fixture Unit (WSFU)	CWSFU (75%)	HWSFU (75%)	CWSFU Total	HWSFU Total
WC	18	3	54	5	5	0	90	0
UR	3	2	6	4	4	0	12	0
LAV	14	1	14	1	0.75	0.75	10.5	10.5
MOP SINK	3	3	9	3	2.25	2.25	6.75	6.75
SINK+DW	1	2	2	1.5	1.125	2.625	1.125	2.625
EWC	2	1	2	0.5	0.5	0	1	0
FLOOR DRAIN	12	2	24	0				
FLOOR SINK	2	3	6	0				
HUB DRAIN	1	8	8	0				
TOTAL:			125				121.4	19.9
TOTAL:							141.25	

PROJECT NAME: CHAFFEY COLLEGE			SHEET 1 OF 1		
SYSTEM: DOMESTIC WATER CALCULATION					
BY: Integral Group			DATE 7/2/2020		
A	WATER PRESSURE:	MAX: 70 PSI MIN: 60 PSI			
B	SYSTEM FU'S	TOTAL FU 142 FU FLUSH VALVE X	FLUSH TANK	=	78 GPM
C	CONT. FLOW GPM (HVAC)			=	10 GPM
D	TOTAL SYSTEM GPM			=	88 GPM
E	PRV (MAKE/MODEL)	SIZE: 2" Inch			
F	METER SIZE:	2" LOSS AT PEAK FLOW		=	2.6 PSI
G	MINIMUM AVAILABLE SYSTEM PRESSURE (OR PRV SET PRESSURE)			=	57.4 PSI
H	RESIDUAL PRESSURE REQUIRED AT REMOTE OUTLET			=	25 PSI
I	ELEVATION LOSS =	25 FT. X	0.433	=	10.8 PSI
J	PRV LOSS (FALL OFF PRESSURE)			=	0 PSI
K	ADDITIONAL BACKFLOW PREVENTER LOSS			=	12 PSI
L	MISCELLANEOUS PRESSURE LOSS			=	0 PSI
M	TOTAL SYSTEM LOSSES (H+I+J+K+L)			=	47.825 PSI
N	PRESSURE AVAILABLE FOR FRICTION LOSS (G-M)			=	9.6 PSI
O	DEVELOPED LENGTH:	200 FT. PLUS 10% FOR FITTINGS		=	220 PSI
P	MAX. FRICITION LOSS PER 100 FEET =	(N) 9.6 / (O) 220	X 100	=	4.4 PSI

PIPE SIZING SCHEDULE

SIZE	GPM	FLUSH TANK	FLUSH VALVE
1/2"	2	1	-
3/4"	5	6	-
1"	10	13	-
1-1/4"	17	24	-
1-1/2"	27	47	12
2"	56	155	76
2-1/2"	86	305	126
3"	140	585	430
4"	217	1070	1067
MAX. DESIGN VELOCITY =			8 FPS
FRICTION LOSS PER 100 FT.			4 PSI

PIPE SIZING SCHEDULE

SIZE	GPM	FLUSH TANK	FLUSH VALVE
1/2"	2	1	-
3/4"	4	5	-
1"	10	13	-
1-1/4"	17	24	-
1-1/2"	27	47	10
2"	48	120	44
2-1/2"	74	246	124
3"	106	412	276
4"	186	851	824
MAX. DESIGN VELOCITY =			5 FPS
FRICTION LOSS PER 100 FT.			4 PSI

PLUMBING FIXTURE COUNT AND CONNECTION SCHEDULE

SYMBOL	DESCRIPTION	MANUFACTURER	MODEL No.	CONNECTION SAN	VENT	CW	HW	WATER SUPPLY FIXTURE UNIT (WSFU) FU	DRAINAGE FIXTURE UNIT (DFU) FU	NOTES
WC-1	FLUSH VALVE WATER CLOSET	AMERICAN STANDARD	AFWALL MILLENNIUM FLOWISE	3"	2"	1.5"	-	5.0	4.0	FLUSH VALVE SLOAN ROYAL III (MANUAL OPERATION)
WC-2	FLUSH VALVE WATER CLOSET (ADA)	AMERICAN STANDARD	AFWALL MILLENNIUM FLOWISE	3"	2"	1.5"	-	5.0	4.0	FLUSH VALVE SLOAN ROYAL III (MANUAL OPERATION)
UR-1	URINAL (ADA)	AMERICAN STANDARD	PINTBROOK	2"	2"	1"	-	0.0	4.0	FLUSH VALVE SLOAN ROYAL 186 (MANUAL OPERATION)
L-1	LAVATORY	AMERICAN STANDARD	LUCERNE	2"	1 1/2"	1/2"	1/2"	1.0	1.0	FAUCET, CHICAGO FAUCET 3400 (MANUAL OPERATION)
L-2	LAVATORY (ADA)	AMERICAN STANDARD	LUCERNE	2"	1 1/2"	1/2"	1/2"	1.0	1.0	FAUCET, CHICAGO FAUCET 3400 (MANUAL OPERATION)
SK-1	KITCHEN SINK	ELKAY	LRAD252255	2"	1 1/2"	3/4"	3/4"	1.5	2.0	FAUCET, CHICAGO FAUCET 10" HIGH SPOUT, 8" REACH
SK-2	SINK	ELKAY	LRAD252255	2"	1 1/2"	3/4"	3/4"	1.5	2.0	FAUCET, CHICAGO FAUCET 10" HIGH SPOUT, 8" REACH
MS-1	ENAMELED CAST IRON MOP SINK	AMERICAN STANDARD	FLOORWELL	3"	2"	3/4"	3/4"	3.0	3.0	FAUCET, CHICAGO FAUCET No. 897-CCP
DF-1	BILEVEL ELECTRIC WATER COOLER WITH BOTTLE FILLING STATION	ELKAY	EMABFTL8WSSK	2"	1 1/2"	1/2"	-	0.5	0.5	PROVIDE WITHOUT FILTER (120V/60 Hz, 6 FLA)
HB-1	HOSE-BIBB	JAY R. SMITH		-	-	3/4"	-	2.5	-	
	TOTAL									

NOTES:
1. WATER SIZING IS BASED ON FLUSH VALVE TYPE WATER CLOSET.
2. NEW DRAINAGE FIXTURE UNITS @ 1/4" SLOPE = MULTIPLE 4" LATERAL (CPC TABLE 7-3 AND 7-5)

EXPANSION TANKS

MARK	MANUFACTURER	MODEL	LOCATION	SERVICE	CAPACITY (GALLONS)	SIZE DIA.	SIZE HT.	PRESSURE INITIAL	PRESSURE FINAL	CONNECTION	NOTES
ET-1	AMTROL	ST-5-C	CUST.	DOMESTIC HOT WATER	2.1	10"	10"	80 PSIG	55 PSIG	1/2"	

NOTES:
1. PROVIDE PRECHARGED STEEL HYDRO-PNEUMATIC TANK WITH ASME REPLACEABLE HEAVY DUTY BUTYL RUBBER BLADDER

DRAIN, CLEANOUT AND ACCESSORY SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	MODEL	STRAINER TYPE	NOTES
FD-1	RESTROOM FLOOR DRAIN	J.R. SMITH	2005Y	5" DIA. SQUARE TOP	CAST IRON BODY WITH STAINLESS STEEL SQUARE TOP, 1/4" MAXIMUM GRATE OPENING
FD-2	MECHANICAL ROOM FLOOR DRAIN	J.R. SMITH	2230Y	12" DIA. TOP	CAST IRON BODY AND GRATE, 1/4" MAXIMUM GRATE OPENING
FS-1	MECHANICAL ROOM FLOOR SINK	J.R. SMITH	-	-	-
PD-1	PLANTER DRAIN	J.R. SMITH	2675		
PD-2	PLANTER DRAIN - SCUPPER DRAIN	J.R. SMITH	9685		PROVIDE WITH PROTECTIVE STAINLESS STEEL MESH FOR PANTING AREA INSTALLATION
DSN-1	DOWNSPOUT COVER WITH HINGED PERFORATED COVER	J.R. SMITH	1775	-	304 STAINLESS STEEL
FCO	FLOOR CLEANOUT	J.R. SMITH	4020	-	CAST IRON CLEANOUT.
GCO	GROUND CLEANOUT	J.R. SMITH	4240	-	CAST IRON CLEANOUT WITH TRACTOR COVER.
VTR ACCESSORY	VENT CAP	JOSAM	26700	-	VENT PIPE SECURING SCREW.
TP-1	TRAP SEAL PRIMER	ZURN	Z1022	-	PROVIDE BRONZE BODY WITH INTEGRAL VACUUM BREAKER SANI-GUARD AUTOMATIC TRAP PRIMER WITH DISTRIBUTION UNIT Z1022-DU2 - Z1022-DU4
TP-2	ELECTRONIC TRAP PRIMER	PLUMBING PRECISION PRODUCTS	MPB-500	-	PROVIDE ACCESS PANEL AND 120V ELECTRICAL POWER
TMV-1	DOMESTIC THEMOSTATIC MIXING VALVE	LAWLER	61-25	-	-
TMV-2	DOMESTIC THEMOSTATIC MIXING VALVE	BRADLEY	S59-4000	-	-
RR-1	ROOF RECEPTOR	J.R. SMITH	3970Y-UDC	-	-
RD/OD-1	COMBINATION ROOF DRAIN / OVERFLOW DRAIN	J.R. SMITH	1850Y-CID	CAST IRON DOME	-
HB-1	WALL MOUNTED HOSE BIB	J.R. SMITH	5509QT		LOCKABLE WALL MOUNTED EXPOSED HOSE BIB

RECIRCULATION PUMP SCHEDULE

MARK	MANUFACTURER	MODEL	LOCATION	SERVICE	PUMP GPM	PUMP HEAD (FT)	MOTOR RPM	MOTOR HP	ELEC. V/Ph/Hz	NOTES
CP-1	GRUNDFOS	UPS-26-99-BUAC/T	CUST.	HOT WATER RETURN	5	20		1/6	120/1/60	

NOTES:
1. PUMP SHALL BE IN-LINE WET ROTOR TYPE AND BRONZE CONSTRUCTION.
2. PROVIDE REMOTE TRANSMITTER/RECEIVER AND HARD WIRED MOTION SENSOR IN EACH RESTROOM AND AT EACH BREAKROOM SINK

AIR-TO-WATER HEAT PUMP WATER HEATER SCHEDULE

MARK	TYPE	MANUFACTURER	MODEL	LOCATION	SERVICE	NOMINAL CAPACITY	1ST HOUR RATING	RECOVERY RATE @ 80 DEG.F TEMP. RISE	# OF ELEMENTS	ELECTRICAL HEATING CAPACITY	RATED HEAT PUMP POWER	POWER	MOC	WEIGHT	NOTES
DHE-1	HYBRID	A.O.SMITH	HPTU-80	CUST.	DOMESTIC WATER	80	95	113 GPH	2	4.5 KW	6 HP	208V/60/1	30 A	931 LBS	NOTE 1,2

NOTES:
1. INSTALL HEAT EXCHANGERS PER MANUFACTURER'S RECOMMENDATIONS/INSTRUCTIONS.
2. REFRIGERANT - R134A
3. EFFICIENCY: HYBRID MODE - 90%; ELECTRIC MODE - 50%

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG AT THIS SHEET'S ORIGINAL PAGE SIZE

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PROJECT:
CHINO INSTRUCTIONAL BUILDING

SHEET NAME:
PLUMBING SCHEDULES AND CALCULATIONS

ADDENDUM #2

FILE NO.: 36-C1 | A#: 04-119722

DATE: 01.19.2022 | CLIENT PROJ NO:

SHEET:

P0.02

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THE LINE SHOWN ABOVE IS 1" WHEN PLOTTED AT FULL SIZE. IF NOT, ADJUST SCALE ACCORDINGLY

ELECTRICAL SYMBOLS AND LEGEND

EXISTING / DEMOLITION

- EXISTING EQUIPMENT / RACEWAYS TO REMAIN
- EXISTING EQUIPMENT / RACEWAYS TO BE REMOVED
- NEW EQUIPMENT / RACEWAYS
- EXISTING TO REMAIN
- EXISTING TO BE REMOVED
- NEW EQUIPMENT, LIGHTING FIXTURE OR DEVICE

SINGLE LINE DIAGRAM

- TRANSFORMER , AS NOTED ON SINGLE LINE DIAGRAM
- TRANSFORMER , AS NOTED ON SINGLE LINE DIAGRAM
- CIRCUIT BREAKER, 3 POLE UNLESS NOTED OTHERWISE
- MOTOR STARTER WITH OVERCURRENT PROTECTION, 3 POLE UNLESS NOTED OTHERWISE
- MOTOR STARTER WITH FUSED AND DISCONNECT SWITCH, 3 POLE UNLESS NOTED OTHERWISE
- G — GROUND FAULT RELAY
- S — SHUNT TRIP RELAY
- DRAW-OUT CIRCUIT BREAKER
- NON-FUSED DISCONNECT SWITCH, 30 AMP, 3P UNLESS NOTED OTHERWISE
- FUSED DISCONNECT SWITCH, 3 POLE UNLESS NOTED OTHERWISE
- M — DEMAND TYPE KWH METER
- M — DEMAND TYPE KWH METER WITH ENCLOSURE
- M — PROVISION FOR UTILITY COMPANY KWH METER
- K — KIRK-KEY INTERLOCK BETWEEN DEVICES
- CURRENT TRANSFORMER (CT)
- AM — AMMETER
- IQ — ELECTRONIC METER
- SEPARABLE CONNECTOR(S)
- GROUND
- SURGE PROTECTIVE DEVICE

GROUNDING SYSTEM

FLOOR	WALL	
✚	✚	GROUND PLATE, FLAT TAPPED SIDE TO BE FLUSH WITH FURNISHED SURFACE. CADWELD B164-2Q OR EQUIVALENT
G	G	GROUND BUS
TG	TG	TECHNICAL GROUND BUS
⊙		GROUND ROD
⊗		GROUND ROD TEST WELL
		EXOTHERMIC GROUND CONNECTION
	—G—	GROUND WIRE

RECEPTACLES / POWER

POKE THRU	FLOOR	WALL	CEILING	
		(18)		MULTI-OUTLET RACEWAY WITH PREWIRED RECEPTACLES MOUNTED 12" ON CENTER UNLESS OTHERWISE NOTED. NUMBER IN (X) PARENTHESIS INDICATES DISTANCE BETWEEN DEVICES. WHERE MULTIPLE CIRCUITS ARE INDICATED CIRCUITS ALTERNATE ALONG ENTIRE LENGTH OF RACEWAY
				SIMPLEX RECEPTACLES
				DUPLEX RECEPTACLES
				QUADRUPLEX RECEPTACLES
	X	X	X	SPECIAL RECEPTACLES (DUPLEX & QUADRUPLEX), REFER TO SPECIAL RECEPTACLE SCHEDULE, THIS SHEET
	X	X	X	
				GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLES
				ABOVE COUNTER RECEPTACLES. INSTALL ABOVE COUNTER OR DEFINED HEIGHT
				HALF CONTROLLED DUPLEX
				HALF CONTROLLED QUADRUPLEX
				SWITCHED RECEPTACLES
				CLOCK RECEPTACLES
		J	J	JUNCTION BOX 4" SQUARE MINIMUM FOR WALL OR CEILING MOUNTED
		J	J	JUNCTION BOX SIZE AS REQUIRED FOR NUMBER OF WIRES OR RACEWAYS
		P	P	SYSTEM FURNITURE POWER FEED. SIMILAR TO WIREMOLD EVOLUTION SERIES EPSF 2

NOTE: ALL RECEPTACLE OUTLETS ON WALLS ARE MOUNTED AT 18" AFF TO CENTER OF DEVICE, UON.

LETTER	RATING	NEMA	SPECIAL RECEPTACLE DESCRIPTION SCHEDULE NOTE: NUMBER OF WIRES INCLUDE GROUND
A	125V, 1Ø, 30A, 2P, 3W	5-30R	WITH 5-30P PLUG
B	125V, 1Ø, 50A, 2P, 3W	5-50R	WITH 5-50P PLUG
D	125/250V, 1Ø, 20A, 3P, 4W	14-20R	WITH 14-20P PLUG
F	125/250V, 1Ø, 30A, 3P, 4W	14-30R	WITH 14-30P PLUG
J	250V, 1Ø, 20A, 2P, 3W	6-20R	WITH 6-20P PLUG
K	250V, 1Ø, 30A, 2P, 3W	6-30R	WITH 6-30P PLUG
L	-	-	'L' INDICATES ASSOCIATED RECEPTACLE IS LOCKING TYPE, PROVIDE MATCHING PLUG FOR EACH RECEPTACLE
M	250V, 1Ø, 50A, 2P, 3W	6-50R	WITH 6-50P PLUG
N	250V, 3Ø, 20A, 3P, 4W	15-20R	WITH 15-20P PLUG
P	250V, 3Ø, 30A, 3P, 4W	15-30R	WITH 15-30P PLUG
R	250V, 3Ø, 50A, 3P, 4W	15-50R	WITH 15-50P PLUG
S	480V, 3Ø, 30A, 3P, 4W	L16-30R	WITH L12-30P PLUG
T	125V, 1Ø, 20A, 2P, 3W	5-20R	ISOLATED GROUND WITH DEDICATED GREEN/YELLOW CONDUCTOR BACK TO GROUND BUS AT PANEL
X	125V, 1Ø, 20A, 2P, 3W	5-20R	WITH 5-20P PLUG
Z	480V, 3Ø, 20A, 3P, 4W	L16-20R	DEDICATED CIRCUIT WITH L16-20R PLUG

NUMBER OF CONDUCTORS AND CONDUIT SIZE

3#12,3/4"C	8 2#8,1#10G,3/4"C
4#12,3/4"C	8 3#8,1#10G,3/4"C
5#12,3/4"C	8 4#8,1#10G,3/4"C
6#12,3/4"C	8 5#8,1#10G,1"C
7#12,3/4"C	8 6#8,1#10G,1"C
8#12,3/4"C	8 7#8,1#10G,1"C
9#12,3/4"C	8 8#8,1#10G,1½"C
3#10,3/4"C	6 2#6,1#10G,3/4"C
4#10,3/4"C	6 3#6,1#10G,1"C
5#10,3/4"C	6 4#6,1#10G,1"C
6#10,3/4"C	6 5#6,1#10G,1"C
7#10,3/4"C	6 6#6,1#10G,1½"C
8#10,1"C	6 7#6,1#10G,1½"C
9#10,3/4"C	6 8#6,1#10G,1½"C

CONDUCTOR COUNT INCLUDES GROUNDING AND NEUTRAL CONDUCTORS THAT ARE NOT INDICATED IN THE HATCH COUNT. CONDUIT SIZES ARE BASED UPON COPPER CONDUCTORS MINIMUM AND MAY BE INCREASED AT CONTRACTORS OPTION FOR LONG OR DIFFICULT RUNS.

LIGHTING

WALL	CEILING	
		RECESSED MOUNTED TROFFER
		SURFACE MOUNTED TROFFER
		SUSPENDED OR PENDANT MOUNTED LUMINAIRE
		STRIP OR TRACK LIGHT
		SURFACE MOUNTED DOWNLIGHT
		RECESSED MOUNTED DOWNLIGHT
		PENDANT MOUNTED DOWNLIGHT
		WALL MOUNTED LUMINAIRE
		DIRECTIONAL LUMINAIRE
		POLE MOUNT FIXTURES (1, 2, 3, 4 HEADS)
EXIT		EXIT SIGN; SHADED PORTION INDICATES ILLUMINATED FACE. DIRECTIONAL ARROWS AS INDICATED ON PLANS. PROVIDE MASTER/SLAVE HIGH AND LOW LEVEL EXIT SIGNS WHEREVER AN EXIT SIGN IS INDICATED ON PLANS
TRACK		
LED		
MULTIPLES		
UNDERWATER		

NOTES:

A. CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING FIXTURE TYPE AND MOUNTING CONDITIONS REGARDLESS OF SYMBOL USED ON PLANS.
B. REFER TO FIXTURE SCHEDULE FOR FIXTURE DESCRIPTION, MOUNTING AND LAMP INFORMATION. SHADED FIXTURE SYMBOLS INDICATE FIXTURE IS CONNECTED TO THE LIFE SAFETY SYSTEM OR HAS SECONDARY POWER SOURCE.

EXAMPLES: NORMAL, EMERGENCY, NORMAL, EMERGENCY

LUMINAIRE NOMENCLATURE: A 3,a,z1 — "A" DENOTES FIXTURE TYPE; "3" DENOTES CIRCUIT NUMBER; "a" DENOTES SWITCH ZONE; "z1" DENOTES DAYLIGHT ZONE; "r1" DENOTES SITE RELAY ZONE

SWITCHING

WALL	CEILING	
S M		MANUAL MOTOR STARTER WITH THERMAL OVERLOAD NUMBER OF POLES AS REQUIRED
S X		SWITCH, SUBSCRIPT INDICATES: X = NONE - SINGLE POLE X = 3 - THREE WAY X = A,B,C - OUTLET CONTROLLED X = 2 - DOUBLE POLE X = KP - KEY OPERATED WITH PILOT LIGHT X = P - PILOT LIGHT X = R - MOMENTARY RELAY ON/OFF
S ab		2-SINGLE POLE SWITCHES, UNDER COMMON PLATE, + 42" UON
S abc		3-SINGLE POLE SWITCHES, UNDER COMMON PLATE, + 42" UON
X33 S L abc		LOW VOLTAGE LIGHTING CONTROL. NUMBER IN ELONGATED HEXAGON INDICATES CONTROL IDENTIFICATION. REFER TO SEQUENCE OF OPERATIONS AND LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION
S LX		LOW VOLTAGE LIGHTING CONTROL SUBSCRIPT INDICATES: X = D - DIMMER SWITCH X = S - SENSOR SWITCH X = T - TIMER SWITCH X = M - LOW VOLTAGE MASTER CONTROL SWITCH
		DIMMER WITH INTEGRAL SWITCH, +42" UON. '600' INDICATES RATING IN WATTS
		ROOM TYPE OCCUPANCY SENSOR, ARROW INDICATES DIRECTION OR ORIENTATION, SUBSCRIPT INDICATES SWITCH LEG OR CIRCUIT TO BE CONTROLLED
		ROOM TYPE OCCUPANCY SENSOR, ARROW INDICATES DIRECTION OR ORIENTATION, SUBSCRIPT INDICATES SWITCH LEG OR CIRCUIT TO BE CONTROLLED
		CORRIDOR TYPE OCCUPANCY SENSOR, ARROW INDICATES DIRECTION OR ORIENTATION, SUBSCRIPT INDICATES SWITCH LEG OR CIRCUIT TO BE CONTROLLED
X		SENSOR TYPE SUBSCRIPT INDICATES: X = DT - DUAL TECHNOLOGY X = H - HALLWAY X = HB - HIGH BAY X = IR - PASSIVE INFRARED X = US - ULTRASONIC
		PUSH-BUTTON STATION. +42" UON
		PHOTOSENSOR - WALL MOUNT WITH DIRECTIONAL VIEW. ARROW INDICATES AIMING DIRECTION
	P	PHOTOSENSOR - CEILING MOUNT WITH DIRECTIONAL VIEW. ARROW INDICATES AIMING DIRECTION
	P	PHOTOSENSOR - CEILING MOUNT WITH 360 VIEW
	RC	ROOM CONTROLLER - CEILING MOUNT
	ER	EMERGENCY RELAY - CEILING MOUNT
	PL	PLUG LOAD CONTROLLER

FIRE ALARM SYSTEM

WALL	CEILING	
	H	HEAT DETECTOR
	H X	HEAT DETECTOR SUBSCRIPT INDICATES: X = C - ABOVE CEILING X = F - BELOW FLOOR
	S	SMOKE DETECTOR
	S X	SMOKE DETECTOR SUBSCRIPT INDICATES: X = C - ABOVE CEILING X = F - BELOW FLOOR X = D - DUCT
S		MANUAL PULL STATION
F	F	STROBE
F	F	HORN/STROBE
F	F	HORN
F WP		HORN - WEATHER PROOF, VANDAL RESISTANT
F	F	BELL
FACP		FIRE ALARM CONTROL PANEL
RNPS		REMOTE NOTIFICATION POWER SUPPLY
FATC		FIRE ALARM TERMINAL CABINET
EOL		END OF LINE RESISTOR
RA		REMOTE ANNUNCIATOR
SD		SMOKE DAMPER
MD		MAGNETIC DOOR HOLDER
AM		ADDRESSABLE MODULE
RM		RELAY MODULE
WFS		WATER FLOW SWITCH
PIV		POST INDICATOR VALVE
VTS		VALVE TAMPER SWITCH

TYPICAL ZONE NOMENCLATURE: 75 N2-4 — "N2" DENOTES NOTIFICATION CIRCUIT "4" DENOTES DEVICE NUMBER; "75" DENOTES CANDELA RATING OF STROBE; H D1-5 — "D1" DENOTES DETECTION ZONE "5" DENOTES DEVICE NUMBER

GENERAL ELECTRICAL SYMBOLS

RECESSED	SURFACE	
		DISCONNECT SWITCH, 30 AMP MINIMUM UNLESS NOTED OTHERWISE
		FUSED DISCONNECT SWITCH, 30 AMP MINIMUM UNLESS NOTED OTHERWISE
		COMBINATION DISCONNECT SWITCH MOTOR STARTED
	S	MOTOR, 5 HP INDICATED
	T	TRANSFORMER
		RELAY OR EQUIPMENT CABINET AS INDICATED ON PLAN
		LIGHTING OR POWER PANEL BOARD

	FREE STANDING SWITCHBOARD, MOTOR CONTROL CENTER OR DISTRIBUTION BOARD
	FIRE TREATED PLYWOOD BACKBOARD 3/4"X96" HIGH X LENGTH AS INDICATED
EEE	ELECTRICAL EQUIPMENT DESIGNATION DESIGNED "EQ01"
1	REFERENCE TO NOTE "1" ON SAME SHEET
FA	LIGHTING FIXTURE DESIGNATION FA = FIXTURE TYPE
P 1	MECHANICAL EQUIPMENT DESIGNATION "P-1" INDICATED
X33	EQUIPMENT NAME OR NUMBER
+4'-6"	MOUNTING HEIGHT FROM FINISHED FLOOR TO CENTERLINE OF OUTLET OR EQUIPMENT
MH=4'-6"	MOUNTING HEIGHT FROM FINISHED FLOOR TO BOTTOM OF OUTLET OR EQUIPMENT
1 E-6	DETAIL REFERENCE NUMBER "1" ON DRAWING "E-6"
A E-6	SECTION OR ELEVATION REFERENCE LETTER "A" ON DRAWING "E-6"
A-1,3,5	INDICATES HOMERUN WITH THREE CIRCUITS AND A SEPARATE NEUTRALS

RACEWAYS AND WIRING

FLOOR	WALL	CEILING	
			CONDUIT CONCEALED IN CEILING OR WALL SPACE
			CONDUIT RUN EXPOSED
			CONDUIT RUN UNDERGROUND OR CONCEALED IN FLOOR SPACE
			EXISTING CONDUIT TO REMAIN
			CONDUIT RISING UP FROM RUN
			CONDUIT DROPPING DOWN FROM RUN
A-1	A-1	A-1	HOMERUN TO PANELBOARD, CABINET OR TERMINAL BACKBOARD AS INDICATED
(MS-01)	(MS-01)	(MS-01)	HOMERUN TO SWITCHBOARD OR MCC AS INDICATED. REFER TO SINGLE LINE DIAGRAM FOR CONDUIT AND WIRE SIZES
<RA-1>	<RA-1>	<RA-1>	HOMERUN TO PANEL VIA INDICATED LIGHTING CONTROL RELAY CABINET. REFER TO INDICATED RELAY CABINET SCHEDULE FOR ADDITIONAL INFORMATION AND CONTROL REQUIREMENTS

NOTE: NOT ALL SYMBOLS AND NOTES SHOWN ARE APPLICABLE FOR THIS PROJECT.

AGENCY APPROVAL:

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HMC Architects

5009006-000

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ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	02.11.2022

KEYNOTES

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REGISTERED PROFESSIONAL ENGINEER — CLIFFORD P. MIRAGLIA — No. E-14506 — REN. JUNE 30, 2022 — ELECTRICAL — STATE OF CALIFORNIA

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL LEGEND

ADDENDUM #2

FILE NO.: 36-C1 — A# : 04-119722

DATE: 01.19.2022 — CLIENT PROJ NO:

SHEET:

E0.02

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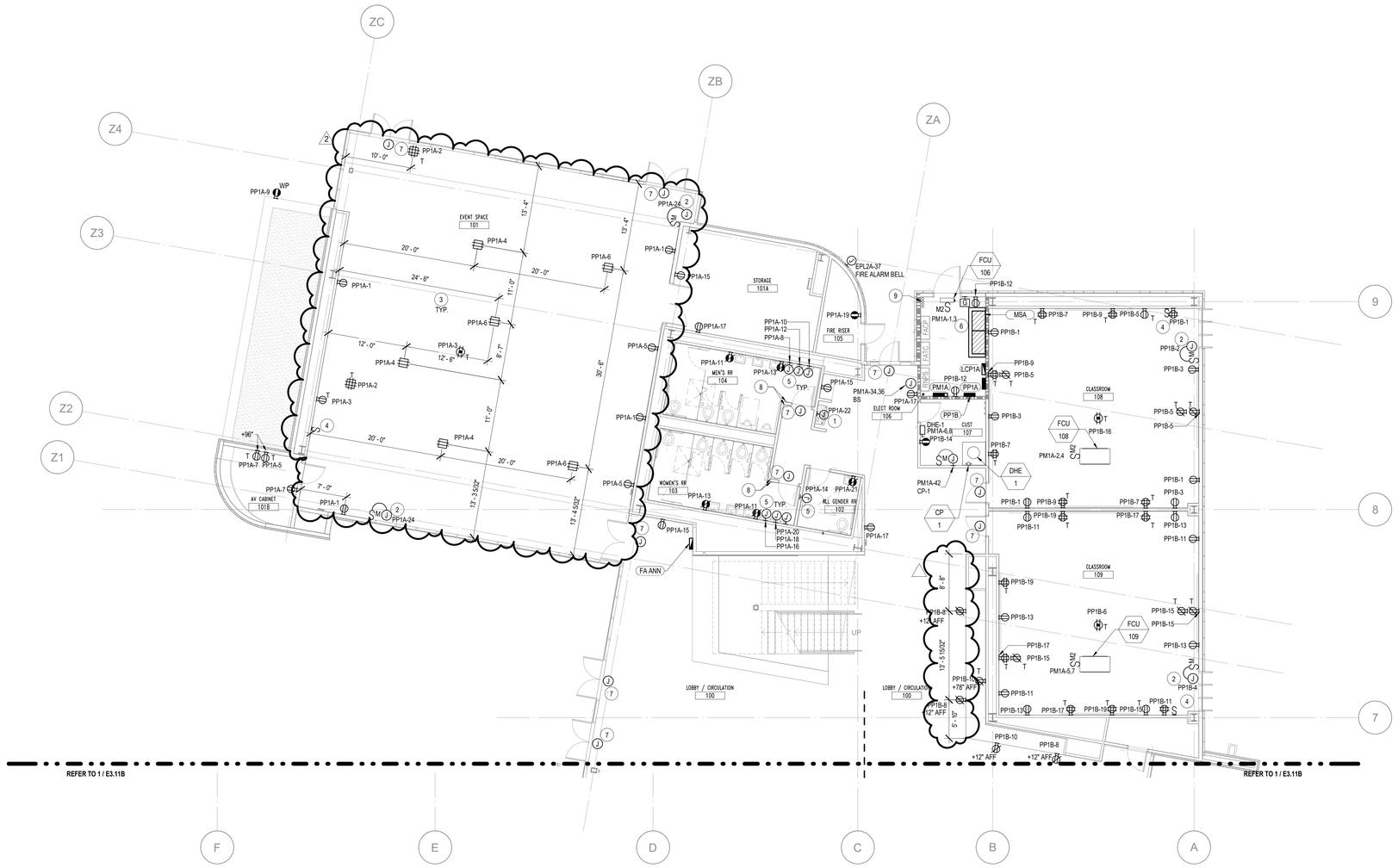
PLEASE RECYCLE

THE LINE SHOWN ABOVE IS 1" LONG WHEN PLOTTED AT FULL SIZE. IF IT IS SHORTER, ADJUST SCALE ACCORDINGLY



GENERAL NOTES

A. COORDINATE EXACT LOCATIONS OF ALL ARCHITECTURAL, MECHANICAL AND PLUMBING EQUIPMENT WITH ARCHITECTURAL, MECHANICAL AND PLUMBING DRAWINGS.

B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

C. SIZE FUSES FOR ALL MECHANICAL AND PLUMBING EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.

D. IN FINISH INTERIOR AREAS, RUN ALL CONDUITS CONCEALED, UNLESS OTHERWISE NOTED. PAINT ALL EXPOSED CONDUITS AND ELECTRICAL EQUIPMENT. REFER TO ARCHITECTS PAINTING SECTION FOR REQUIREMENTS.

E. ALL CABLING ASSOCIATED WITH TELECOM, AV AND SECURITY SHALL BE IN CONDUIT.

F. MULTIWIRE BRANCH CIRCUITS SHALL NOT BE SERVED FROM MULTIPLE SINGLE POLE BREAKERS. PROVIDE DEDICATED NEUTRAL PER CIRCUIT TO DISCONNECT MULTIWIRE BRANCH CIRCUITS PER CEC 210.4(B).

G. REFER ARCHITECTURAL DRAWINGS FOR ALL DEVICE MOUNTING HEIGHTS.

H. ALL ELECTRICAL ROOM DOORS ARE EGRESS DOORS AND SHOULD SWING OUT PER NEC. PANIC HARDWARE IS REQUIRED.

I. CONTRACTOR TO REFERENCE SECURITY DRAWINGS FOR ADDITIONAL CONDUITS REQUIRED FOR ACCESS CONTROL SYSTEMS.

REFERENCE NOTES

1. PROVIDE POWER CONNECTION FOR BOTTLE FILLER/DRINKING FOUNTAIN. REFERENCE EQUIPMENT CUTSHEETS AND PLUMBING DRAWINGS FOR FURTHER INFORMATION.COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
2. CONNECTION TO MOTORIZED SHADE. COORDINATE EXACT POWER AND CONTROL REQUIREMENTS WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
3. 2-GANG INFLOOR BOX SIMILAR TO HUBBELL INFLOOR BOX. COVERPLATE COLOR FINISH BY ARCHITECT.
4. CONTROL SWITCH FOR MOTORIZED SHADE. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
5. POWER CONNECTION FOR HAND DRYERS. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
6. PROVIDE 2" MINIMUM HOUSEKEEPING PAD FOR EQUIPMENT.
7. PROVIDE POWER CONNECTION FOR DOOR HARDWARE FROM SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE SECURITY DRAWINGS SE-W1 FOR CONNECTION AND WIRING INFORMATION.
8. PROVIDE 3/4" CONDUIT FROM WALL MOUNTED AUTO ACTUATORS TO POWER SUPPLY ON TOP OF THE DOOR.
9. PROVIDE (4) 2" CONDUITS STUB-UP FOR FUTURE PV SYSTEM TO MAIN ELECTRICAL ROOM ON LEVEL 2. VERIFY LOCATION WITH ARCHITECT PRIOR TO ROUGH IN. LABEL BOTH ENDS OF THE CONDUIT WITH THE LOCATION OF THE OPPOSITE END AND FUTURE PV.

AGENCY APPROVAL:

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2	ADDENDUM 2	02.11.2022

KEYNOTES

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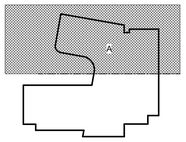
REGISTERED PROFESSIONAL ENGINEER
CLARLO P. MARQUEZ
No. E-14506
REN. JUNE 30, 2022
ELECTRICAL
STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL POWER PLAN - FIRST FLOOR - SEGMENT A

ADDENDUM #2

FILE NO.: **36-C1** | A# : **04-119722**

DATE: **01.19.2022** | CLIENT PROJ NO:

SHEET:

E3.11A

ELECTRICAL POWER PLAN - FIRST FLOOR - SEGMENT A **1** 1/8" = 1'-0"

PLEASE RECYCLE

BIM 360://5009 Chino Chaffey CC - Campus Projects/5009006000-MEP-CCCIB.rvt
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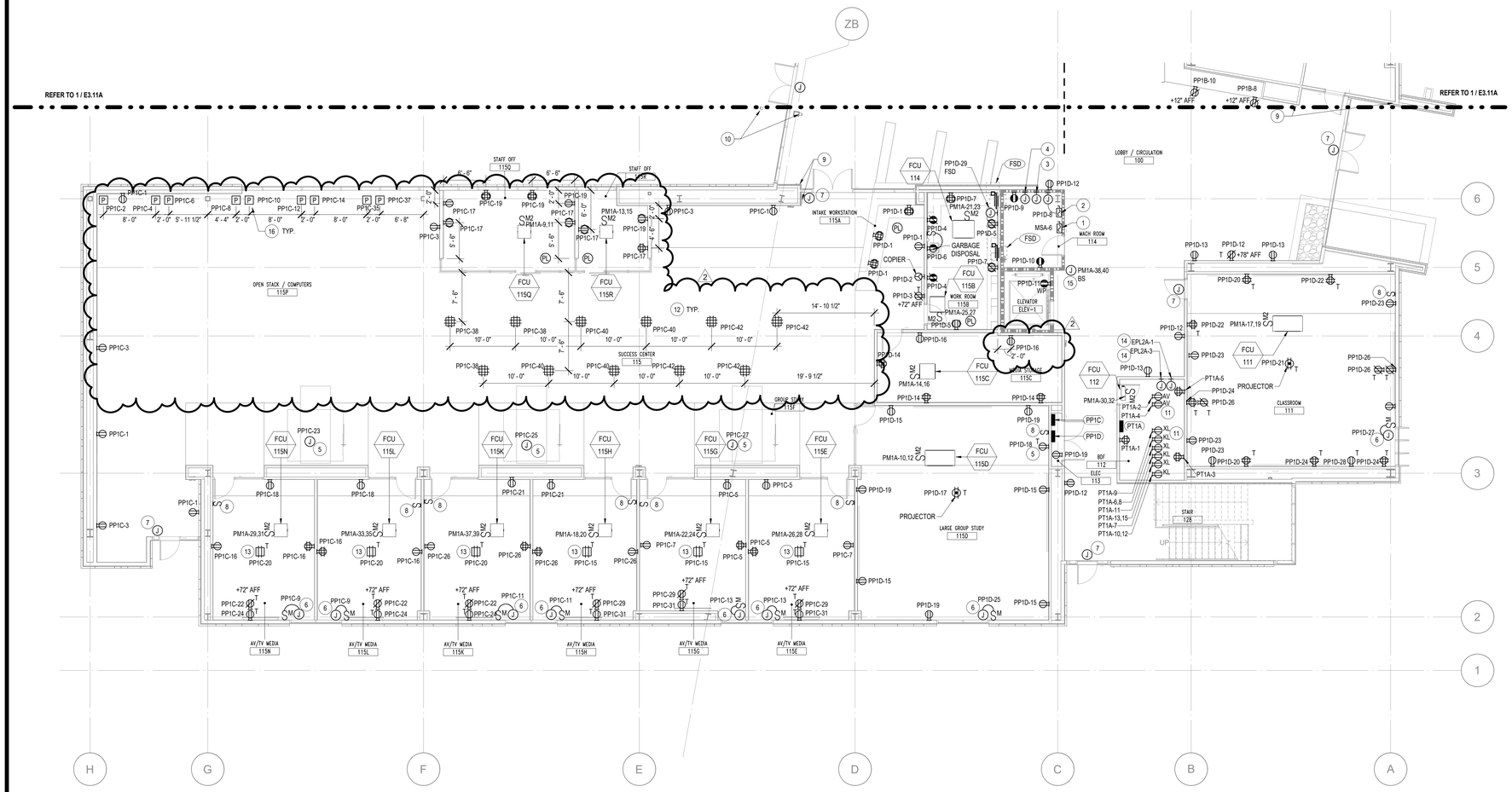
THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL SIZE



GENERAL NOTES

A. COORDINATE EXACT LOCATIONS OF ALL ARCHITECTURAL, MECHANICAL AND PLUMBING EQUIPMENT WITH ARCHITECTURAL, MECHANICAL AND PLUMBING DRAWINGS.

B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

C. SIZE FUSES FOR ALL MECHANICAL AND PLUMBING EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.

D. IN FINISH INTERIOR AREAS, RUN ALL CONDUITS CONCEALED, UNLESS OTHERWISE NOTED. PAINT ALL EXPOSED CONDUITS AND ELECTRICAL EQUIPMENT. REFER TO ARCHITECTS PAINTING SECTION FOR REQUIREMENTS.

E. ALL CABLING ASSOCIATED WITH TELECOM, AV AND SECURITY SHALL BE IN CONDUIT.

F. MULTIWIRE BRANCH CIRCUITS SHALL NOT BE SERVED FROM MULTIPLE SINGLE POLE BREAKERS. PROVIDE DEDICATED NEUTRAL PER CIRCUIT TO DISCONNECT MULTIWIRE BRANCH CIRCUITS PER CEC 210.4(B).

G. REFER ARCHITECTURAL DRAWINGS FOR ALL DEVICE MOUNTING HEIGHTS.

H. ALL ELECTRICAL ROOM DOORS ARE EGRESS DOORS AND SHOULD SWING OUT PER NEC. PANIC HARDWARE IS REQUIRED.

I. CONTRACTOR TO REFERENCE SECURITY DRAWINGS FOR ADDITIONAL CONDUITS REQUIRED FOR ACCESS CONTROL SYSTEMS.

REFERENCE NOTES

1. ELEVATOR MAIN POWER DISCONNECT. COORDINATE EXACT LOCATION WITH ELEVATOR INSTALLER PRIOR TO ROUGH IN. SEE SINGLE LINE DIAGRAM FOR ADDITIONAL REQUIREMENTS.
2. ELEVATOR CAB LIGHT DISCONNECT SWITCH AND J-BOX. COORDINATE EXACT LOCATION WITH ELEVATOR INSTALLER.
3. PROVIDE J-BOX FOR FIRE ALARM CONNECTION TO ELEVATOR CONTROLLER. COORDINATE EXACT LOCATION WITH ELEVATOR INSTALLER.
4. PROVIDE J-BOX FOR COMMUNICATION TO ELEVATOR CONTROLLER. COORDINATE EXACT LOCATION WITH ELEVATOR INSTALLER AND TECHNOLOGY CONTRACTOR.
5. PROVIDE CONNECTION TO FURNITURE SYSTEMS. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE EQUIPMENT INSTALLATION MANUAL FOR WIRING INFORMATION.
6. CONNECTION TO MOTORIZED SHADE. COORDINATE EXACT LOCATION FOR POWER AND CONTROLS WITH ARCHITECT. REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
7. PROVIDE POWER CONNECTION FOR DOOR HARDWARE FROM SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE SECURITY DRAWINGS SE-W1 FOR CONNECTION AND WIRING INFORMATION.
8. CONTROL SWITCH FOR MOTORIZED SHADE. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
9. PROVIDE 3/4" CONDUIT FROM WALL MOUNTED AUTO ACTUATORS TO POWER SUPPLY ON TOP OF THE DOOR.
10. PROVIDE 3/4" CONDUIT FROM BOLLARD MOUNTED AUTO ACTUATORS TO POWER SUPPLY ON TOP OF THE DOOR.
11. RECEPTACLE ON TELECOM LADDER CABLE RUNWAY.

    XL - ELECTRICAL DUPLEX 120V/20A (NEMA L5-20R) DEDICATED OUTLET.
    RL - ELECTRICAL 208V/30A (NEMA L6-30R) DEDICATED OUTLET.
    AV - ELECTRICAL DUPLEX 120V/20A OUTLET FOR AV SYSTEM.
12. 2-GANG INFLOOR BOX SIMILAR TO HUBBELL INFLOOR BOX. COVERPLATE COLOR FINISH BY ARCHITECT.
13. SINGLE GANG INFLOOR BOX SIMILAR TO HUBBELL INFLOOR BOX. COVERPLATE FINISH BY ARCHITECT.
14. 120V POWER CONNECTION FOR SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT.
15. PROVIDE JUNCTION BOX FOR POWER CONNECTIONS TO HVAC CONTROLS AND SMALL EQUIPMENT FROM JUDNTION BOX LOCATED ABOVE CEILING. EXTEND WIRES AND CONDUIT (3/4"C. (2)#12, & (1)#12 GND), TO EACH HVAC CONTROL AND SMALL EQUIPMENT LOCATION. REFER TO MECHANICAL AND PLUMBING DOCUMENTS FOR LOCATIONS OF BSB'S, VAV'S, DDC PANELS, ETC. PAINT BOX YELLOW AND PROVIDE ENGRAVED PLACARD TO READ "MECHANICAL SYSTEMS CONTROL POWER ONLY. CONNECT MAX 200 WATTS PER CIRCUIT."
16. PROVIDE FURNITURE FEED FLOOR BOX SIMILAR TO WIREMOLD EVOLUTION SERIES EFBFF. COLOR BY ARCHITECT.

AGENCY APPROVAL:

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2	ADDENDUM 2	02.11.2022

KEYNOTES

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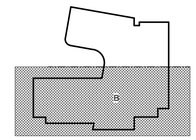
REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER P. MARRAN No. E-14506 REN. JUNE 30, 2022 ELECTRICAL STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL POWER PLAN - FIRST FLOOR - SEGMENT B

ADDENDUM #2

FILE NO.: **36-C1** A# : **04-119722**

DATE: **01.19.2022** CLIENT PROJ NO:

SHEET:

E3.11B

ELECTRICAL POWER PLAN - FIRST FLOOR - SEGMENT B 1 1/8" = 1'-0"

PLEASE RECYCLE

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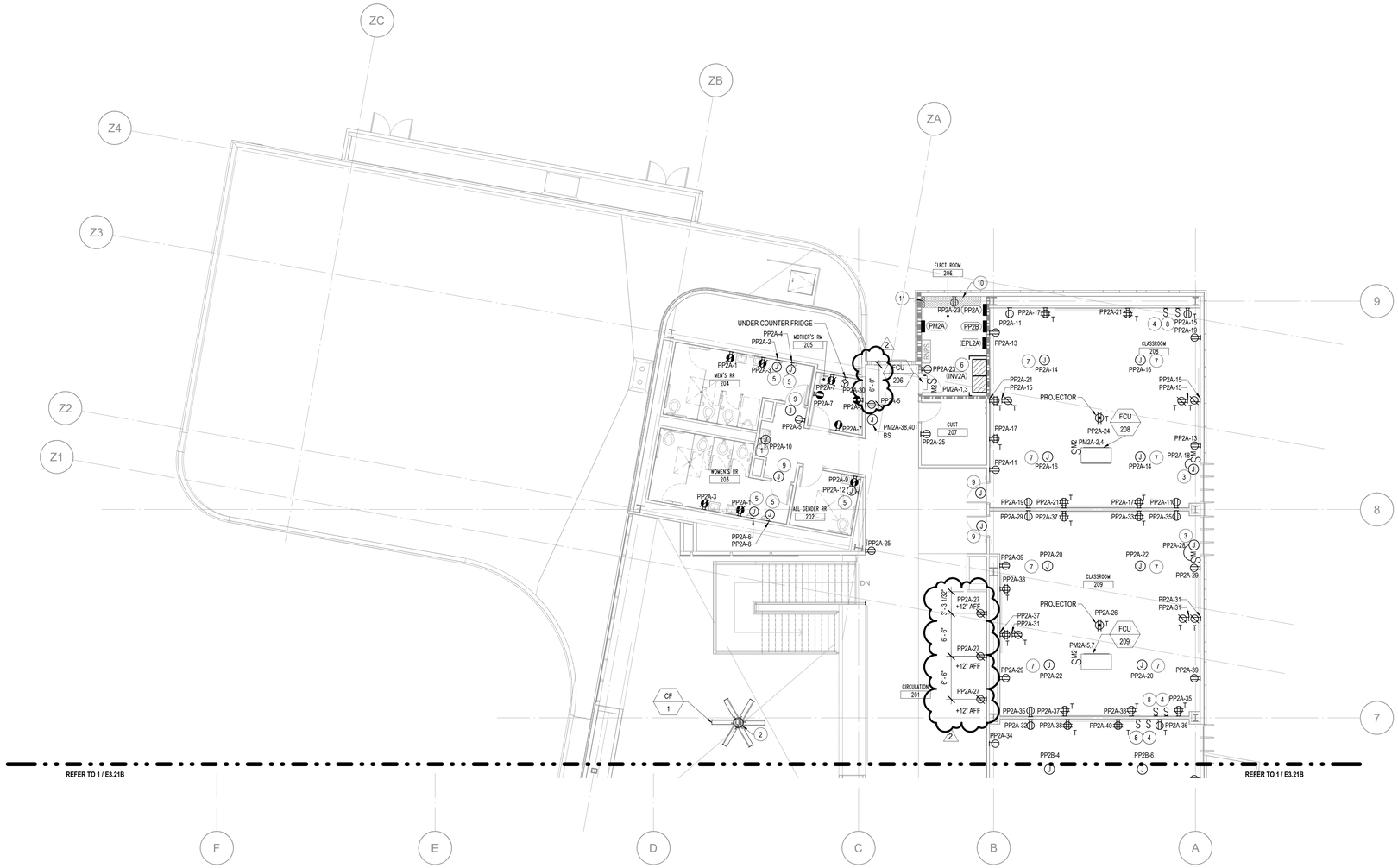

GENERAL NOTES

A. COORDINATE EXACT LOCATIONS OF ALL ARCHITECTURAL, MECHANICAL AND PLUMBING EQUIPMENT WITH ARCHITECTURAL, MECHANICAL AND PLUMBING DRAWINGS.

B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

C. SIZE FUSES FOR ALL MECHANICAL AND PLUMBING EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.

D. IN FINISH INTERIOR AREAS, RUN ALL CONDUITS CONCEALED, UNLESS OTHERWISE NOTED. PAINT ALL EXPOSED CONDUITS AND ELECTRICAL EQUIPMENT. REFER TO ARCHITECTS PAINTING SECTION FOR REQUIREMENTS.

E. ALL CABLING ASSOCIATED WITH TELECOM, AV AND SECURITY SHALL BE IN CONDUIT.

F. MULTIWIRE BRANCH CIRCUITS SHALL NOT BE SERVED FROM MULTIPLE SINGLE POLE BREAKERS. PROVIDE DEDICATED NEUTRAL PER CIRCUIT TO DISCONNECT MULTIWIRE BRANCH CIRCUITS PER CEC 210.4(B).

G. REFER ARCHITECTURAL DRAWINGS FOR ALL DEVICE MOUNTING HEIGHTS.

H. ALL ELECTRICAL ROOM DOORS ARE EGRESS DOORS AND SHOULD SWING OUT PER NEC. PANIC HARDWARE IS REQUIRED.

I. CONTRACTOR TO REFERENCE SECURITY DRAWINGS FOR ADDITIONAL CONDUITS REQUIRED FOR ACCESS CONTROL SYSTEMS.

REFERENCE NOTES

1. PROVIDE POWER CONNECTION FOR BOTTLE FILLER/DRINKING FOUNTAIN. REFERENCE EQUIPMENT CUTSHEETS' AND PLUMBING DRAWINGS FOR FURTHER INFORMATION.COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
2. PROVIDE POWER CONNECTION TO CEILING FAN. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE EQUIPMENT CUTSHEET FOR WIRING AND CONTROL REQUIREMENTS.
3. CONNECTION TO MOTORIZED SHADES. COORDINATE EXACT LOCATION FOR POWER AND CONTROLS WITH ARCHITECT. REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
4. CONTROL SWITCH FOR MOTORIZED SHADE. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
5. CONNECTION FOR HAND DRYERS. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
6. PROVIDE MINIMUM 2" HOUSEKEEPING PAD FOR EQUIPMENT.
7. CONNECTION TO SKYLIGHT DIMMER. COORDINATE EXACT POWER AND CONTROL REQUIREMENTS WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
8. CONTROL SWITCH FOR SKYLIGHT DIMMER. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
9. PROVIDE POWER CONNECTION FOR DOOR HARDWARE FROM SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE SECURITY DRAWINGS SE-W1 FOR CONNECTION AND WIRING INFORMATION.
10. RESERVED SPACE FOR FUTURE PV EQUIPMENT.
11. PROVIDE (4) 2" CONDUITS STUB-UP FOR FUTURE PV SYSTEM FROM MAIN ELECTRICAL ROOM ON LEVEL 1. VERIFY LOCATION WITH ARCHITECT PRIOR TO ROUGH IN. LABEL BOTH ENDS OF THE CONDUIT WITH THE LOCATION OF THE OPPOSITE END AND FUTURE PV.

TN
PN

ELECTRICAL POWER PLAN - SECOND FLOOR - SEGMENT A | **1** 1/8" = 1'-0"

PLEASE RECYCLE

AGENCY APPROVAL:

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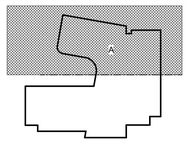
REGISTERED PROFESSIONAL ENGINEER
DAVID P. MARQUEZ
No. E-14506
REN. JUNE 30, 2022
ELECTRICAL
STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL POWER PLAN - SECOND FLOOR - SEGMENT A

ADDENDUM #2

FILE NO.: 36-C1	A# : 04-119722
DATE: 01.19.2022	CLIENT PROJ NO:

SHEET:

E3.21A

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THE LINE SHOWN ABOVE IS EXACTLY 1" WHEN PRINTED AT 36" SHEETS (ORIGINAL SHEET SIZE)

GENERAL NOTES

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D. IN FINISH INTERIOR AREAS, RUN ALL CONDUITS CONCEALED, UNLESS OTHERWISE NOTED. PAINT ALL EXPOSED CONDUITS AND ELECTRICAL EQUIPMENT. REFER TO ARCHITECTS PAINTING SECTION FOR REQUIREMENTS.

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G. REFER ARCHITECTURAL DRAWINGS FOR ALL DEVICE MOUNTING HEIGHTS.

H. ALL ELECTRICAL ROOM DOORS ARE EGRESS DOORS AND SHOULD SWING OUT PER NEC. PANIC HARDWARE IS REQUIRED.

I. CONTRACTOR TO REFERENCE SECURITY DRAWINGS FOR ADDITIONAL CONDUITS REQUIRED FOR ACCESS CONTROL SYSTEMS.

REFERENCE NOTES

1. CONNECTION TO MOTORIZED SCREEN. COORDINATE EXACT LOCATION FOR POWER AND CONTROLS WITH ARCHITECT REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
2. CONTROL SWITCH FOR MOTORIZED SHADE. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
3. CONNECTION TO HAND DRYER. COORDINATE EXACT LOCATION WITH THE ARCHITECT PRIOR TO ROUGH-IN.
4. CONNECTION TO SKYLIGHT DIMMER. COORDINATE EXACT POWER AND CONTROL REQUIREMENTS WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE EQUIPMENT CUTSHEET FOR WIRING INFORMATION.
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6. PROVIDE POWER CONNECTION FOR DOOR HARDWARE FROM SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN. REFERENCE SECURITY DRAWINGS SE-W1 FOR CONNECTION AND WIRING INFORMATION.
7. RECEPTACLE ON TELECOM LADDER CABLE RUNWAY.

   XL - ELECTRICAL DUPLEX 120V/20A (NEMA L5-20R) DEDICATED OUTLET.
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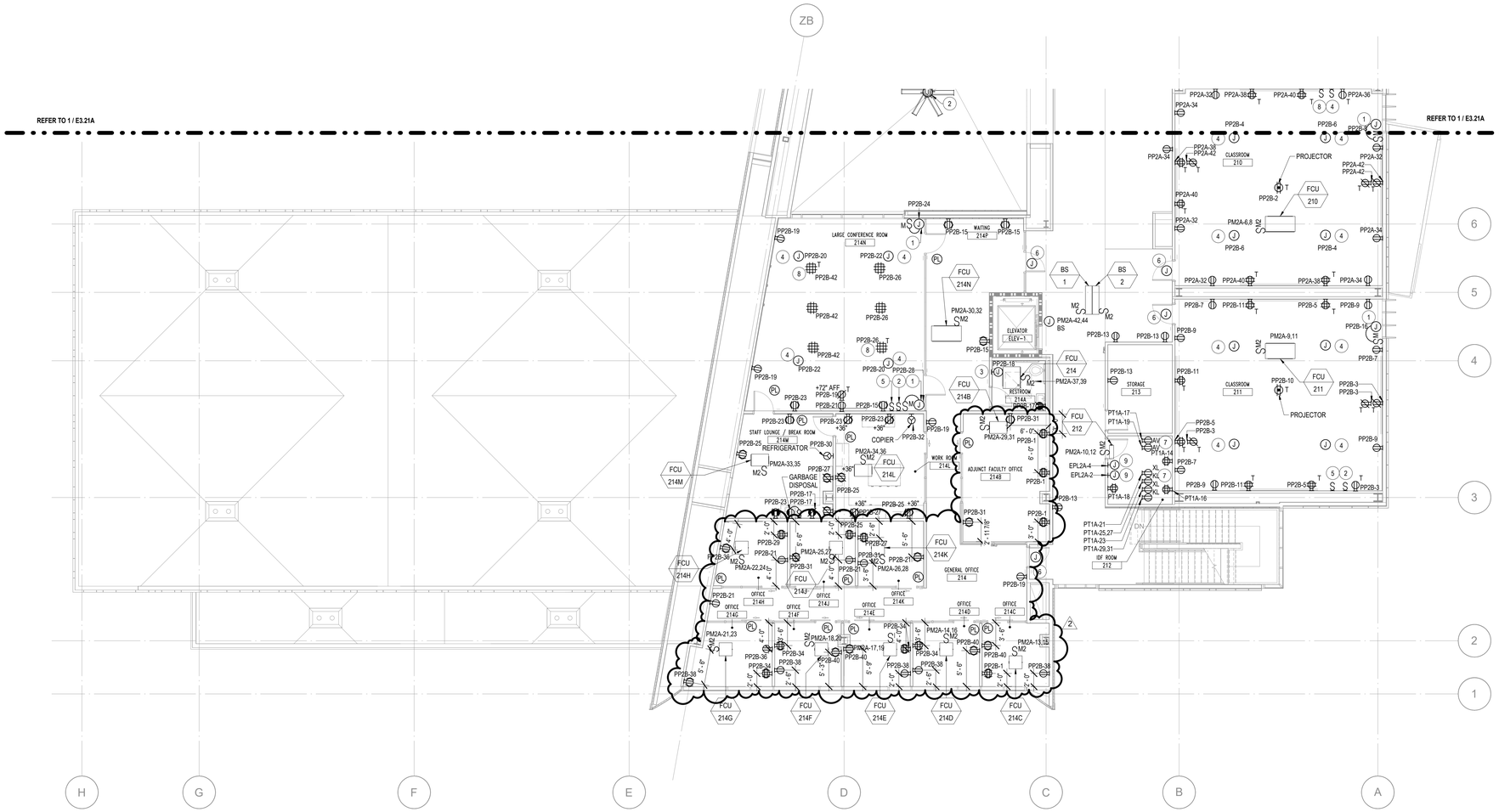
8. 2-GANG INFLOOR BOX SIMILAR TO HUBBELL INFLOOR BOX. COVERPLATE COLOR FINISH BY ARCHITECT.
9. 120V POWER CONNECTION FOR SECURITY PANEL. COORDINATE EXACT LOCATION WITH ARCHITECT.



ELECTRICAL POWER PLAN - SECOND FLOOR - SEGMENT B | 1 | 1/8" = 1'-0"

PLEASE RECYCLE

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

Chaffey College

HMC Architects

5009006-000

3546 CONCOURS STREET
ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	02.11.2022

KEYNOTES

LEGENDS

CONSULTANT

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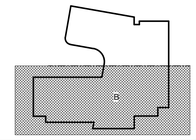
REGISTERED PROFESSIONAL ENGINEER
CLIFTON P. MARRATT
No. E-14506
REN. JUNE 30, 2022
ELECTRICAL
STATE OF CALIFORNIA

KEY PLAN:



FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL POWER PLAN - SECOND FLOOR - SEGMENT B

ADDENDUM #2

FILE NO.: 36-C1 | **A# : 04-119722**

DATE: **01.19.2022** | CLIENT PROJ NO:

SHEET:

E3.21B

BIM 360://5009 Chino Chaffey CC - Campus Projects/5009006000-MEP-CCCIB.rvt
2/4/2022 8:31:38 AM

THE LINE SHOWN ABOVE IS 1" LONG ON ORIGINAL PLOT. IF NOT, ADJUST SCALE ACCORDINGLY

PANEL: PP1A

VOLTS: 120/208 **PHASES:** 3 **WIRES:** 4 **MOUNTING:** SURFACE
LOCATION: ELECT ROOM 106 **SUPPLY FROM:** MSA **KAIC:** 25KA **KASC:** 17.5KA
MAIN BREAKER: 200 A **AMP BUSSING:** 225 A **NEUTRAL BUS:** 225 A **IG BUS:** NA

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	R - EVENT SPACE 101	20 A	1	720	720					1	20 A	R - EVENT SPACE 101	2
3	R - PROJECTOR EVENT SPACE 101	20 A	1			1180	540			1	20 A	R - EVENT SPACE 101	4
5	R - EVENT SPACE 101	20 A	1					540	540	1	20 A	R - EVENT SPACE 101	6
7	R - AV CABINET 101B	20 A	1	360	1725					1	20 A	R - HAND DRYER MEN'S RR 104	8
9	R - OUTDOOR	20 A	1			180	1725			1	20 A	R - HAND DRYER MEN'S RR 104	10
11	R - RESTROOM 103 & 104	20 A	1					360	1725	1	20 A	R - HAND DRYER MEN'S RR 104	12
13	R - RESTROOM 103 & 104	20 A	1	360	500					1	20 A	R - HAND DRYER ALL GENDER RR 102	14
15	R - LOBBY 100 & STORAGE 101A	20 A	1			540	1725			1	20 A	R - HAND DRYER WOMEN'S RR 103	16
17	R - LOBBY 100 & STORAGE 101A	20 A	1					540	1725	1	20 A	R - HAND DRYER MEN'S RR 104	18
19	R - FIRE RISER 102	20 A	1	180	1725					1	20 A	R - HAND DRYER MEN'S RR 104	20
21	R - ALL GENDER RR 102	20 A	1			180	500			1	20 A	R - WATER FOUNTAIN LOBBY 100	22
23	L - LIGHTING 101 & 101B	20 A	1					425	500	1	20 A	R - MOTORIZED SHADES EVENT SPACE 101	24
25	L - LIGHTING STORAGE...	20 A	1	1210	185					1	20 A	L - LIGHTING EVENT SPACE 101	26
27	L - LIGHTING EXTERIOR	20 A	1			109	485			1	20 A	L - LIGHTING EVENT SPACE 101	28
29	L - LIGHTING EXTERIOR	20 A	1					684	437	1	20 A	L - LIGHTING EXTERIOR	30
31	L - LIGHTING EXTERIOR	20 A	1	342	646					1	20 A	L - LIGHTING EXTERIOR	32
33	L - LIGHTING EXTERIOR	20 A	1			1526	555			1	20 A	L - LIGHTING EXTERIOR	34
35	R - RECEPTACLE EXTERIOR	20 A	1					720	360	1	20 A	R - RECEPTACLE EXTERIOR	36
37	R - RECEPTACLE EXTERIOR	20 A	1	180	500					1	20 A	R - RECEPTACLE	38
39	SPARE	20 A	1			0	0			1	20 A	SPARE	40
41	SPARE	20 A	1					0	0	1	20 A	SPARE	42
43	SPARE	20 A	1	0	0					1	20 A	SPARE	44
45	SPARE	20 A	1			0	0			1	20 A	SPARE	46
47	SPARE	20 A	1					0	0	1	20 A	SPARE	48
				9352 VA		9245 VA		8556 VA					
				Ø A		Ø B		Ø C					

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
R - RECEPTACLE	20550 VA	74.33%	15275 VA
L - LIGHTING	6603 VA	125.00%	8254 VA

PANEL TOTALS	
TOTAL CONNECTED LOAD:	27153 VA
TOTAL CONNECTED CURRENT:	75 A
TOTAL ESTIMATED DEMAND LOAD:	23529 VA
TOTAL ESTIMATED DEMAND CURRENT:	65 A

PANEL: PP1B

VOLTS: 120/208 **PHASES:** 3 **WIRES:** 4 **MOUNTING:** SURFACE
LOCATION: ELECT ROO... **SUPPLY FROM:** MSA **KAIC:** 25KA **KASC:** 16.7KA
MAIN BREAKER: 200 A **AMP BUSSING:** 225 A **NEUTRAL BUS:** 225 A **IG BUS:** NA

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	R - CLASSROOM 108	20 A	1	720	500					1	20 A	R - MOTORIZED SHADES CLASSROOM 108	2
3	R - CLASSROOM 108	20 A	1			540	500			1	20 A	R - MOTORIZED SHADES CLASSROOM 109	4
5	R - CLASSROOM 108	20 A	1					720	1000	1	20 A	R - PROJECTOR CLASSROOM 109	6
7	R - CLASSROOM 108	20 A	1	420	540					1	20 A	R - LOBBY 100	8
9	R - CLASSROOM 108	20 A	1			360	360			1	20 A	R - LOBBY 100	10
11	R - CLASSROOM 109	20 A	1					720	360	1	20 A	R - ELECT ROOM 106	12
13	R - CLASSROOM 109	20 A	1	720	180					1	20 A	R - CUST 107	14
15	R - CLASSROOM 109	20 A	1			720	1000			1	20 A	R - PROJECTOR CLASSROOM 108	16
17	R - CLASSROOM 109	20 A	1					360	978	1	20 A	L - LIGHTING ELECT ROOM 106	18
19	R - CLASSROOM 109	20 A	1	360	500					1	20 A	FACP ELECT ROOM 106	20
21	SPARE	20 A	1			0	500			1	20 A	RNPS ELECT ROOM 106	22
23	SPARE	20 A	1					0	0	1	20 A	SPARE	24
25	SPARE	20 A	1	0	0					1	20 A	SPARE	26
27	SPARE	20 A	1			0	0			1	20 A	SPARE	28
29	SPARE	20 A	1					0	0	1	20 A	SPARE	30
31	SPACE	--	--	0	0					--	--	SPACE	32
33	SPACE	--	--			0	0			--	--	SPACE	34
35	SPACE	--	--					0	0	--	--	SPACE	36
37	SPACE	--	--	0	0					--	--	SPACE	38
39	SPACE	--	--			0	0			--	--	SPACE	40
41	SPACE	--	--					0	0	--	--	SPACE	42
				3940 VA		3980 VA		4138 VA					
				Ø A		Ø B		Ø C					

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
Other	1000 VA	100.00%	1000 VA
R - RECEPTACLE	10080 VA	99.60%	10040 VA
L - LIGHTING	978 VA	125.00%	1223 VA

PANEL TOTALS	
TOTAL CONNECTED LOAD:	12058 VA
TOTAL CONNECTED CURRENT:	33 A
TOTAL ESTIMATED DEMAND LOAD:	12263 VA
TOTAL ESTIMATED DEMAND CURRENT:	34 A

PANEL: PP1C

VOLTS: 120/208 **PHASES:** 3 **WIRES:** 4 **MOUNTING:** SURFACE
LOCATION: **SUPPLY FROM:** MSA **KAIC:** 10KA **KASC:** 6.9KA
MAIN BREAKER: 200 A **AMP BUSSING:** 225 A **NEUTRAL BUS:** 225 A **IG BUS:** NA

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	R - OPEN STACK/COMPUTERS 115P	20 A	1	720	1200					1	20 A	R - OPEN STACK / COMPUTERS 115P	2
3	R - OPEN STACK/COMPUTERS 115P	20 A	1			720	1200			1	20 A	R - OPEN STACK / COMPUTERS 115P	4
5	R - AV/TV MEDIA 115K, 115H	20 A	1					600	1200	1	20 A	R - OPEN STACK / COMPUTERS 115P	6
7	R - AV/TV MEDIA 115K, 115H	20 A	1	360	1200					1	20 A	R - OPEN STACK / COMPUTERS 115P	8
9	R - AV/TV MEDIA 115N, 115L	20 A	1			1000	1200			1	20 A	R - OPEN STACK / COMPUTERS 115P	10
11	R - AV/TV MEDIA 115K, 115H	20 A	1					1000	1200	1	20 A	R - OPEN STACK / COMPUTERS 115P	12
13	R - AV/TV MEDIA 115Q, 115E	20 A	1	1000	1200					1	20 A	R - OPEN STACK / COMPUTERS 115P	14
15	R - FB AV/TV MEDIA 115H, 115G, 115E	20 A	1			540	600			1	20 A	R - AV/TV MEDIA 115N, 115L	16
17	R - STAFF OFF 115Q, 115R	20 A	1					720	360	1	20 A	R - AV/TV MEDIA 115N, 115L	18
19	R - STAFF OFF 115Q, 115R	20 A	1	660	540					1	20 A	R - FB AV/TV MEDIA 115K, 115L, 115N	20
21	R - AV/TV MEDIA 115K, 115H	20 A	1			360	540			1	20 A	R - AV/TV MEDIA 115K, 115L, 115N	22
23	R - FURNITURE SYSTEMS GROUP STUDY...	20 A	1					500	540	1	20 A	R - AV/TV MEDIA 115K, 115L, 115N	24
25	R - FURNITURE SYSTEMS GROUP STUDY 115J	20 A	1	500	600					1	20 A	R - AV/TV MEDIA 115K, 115H	26
27	R - FURNITURE SYSTEMS STUDY 115F	20 A	1			500	1016			1	20 A	L - LIGHTING 115 (N,L,K,H,G,E,F)	28
29	R - AV/TV MEDIA ROOM 115E, 115G, 115H	20 A	1					540	66	1	20 A	L - LIGHTING 115	30
31	R - AV/TV MEDIA ROOM 115E, 115G, 115H	20 A	1	540	0					1	20 A	SPARE	32
33	L - LIGHTING 115, 115Q, 115R	20 A	1			1143	0			1	20 A	SPARE	34
35	R - OPEN STACK / COMPUTERS 115P	20 A	1					1200	0	1	20 A	SPARE	36
37	R - OPEN STACK / COMPUTERS 115P	20 A	1	1200	1080					1	20 A	R - FB SUCCESS CENTER 115	38
39	SPARE	20 A	1			0	1440			1	20 A	R - FB SUCCESS CENTER 115	40
41	SPARE	20 A	1					0	1440	1	20 A	R - FB SUCCESS CENTER 115	42
				10800 VA		10259 VA		9366 VA					
				Ø A		Ø B		Ø C					

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
R - RECEPTACLE	28200 VA	67.73%	19100 VA
L - LIGHTING	2225 VA	125.00%	2782 VA

PANEL TOTALS	
TOTAL CONNECTED LOAD:	30425 VA
TOTAL CONNECTED CURRENT:	84 A
TOTAL ESTIMATED DEMAND LOAD:	21882 VA
TOTAL ESTIMATED DEMAND CURRENT:	61 A

PANEL: PP1D

VOLTS: 120/208 **PHASES:** 3 **WIRES:** 4 **MOUNTING:** SURFACE
LOCATION: **SUPPLY FROM:** MSA **KAIC:** 10KA **KASC:** 6.9KA
MAIN BREAKER: 200 A **AMP BUSSING:** 225 A **NEUTRAL BUS:** 225 A **IG BUS:** NA

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	R - INTAKE WORKSTATION 115A	20 A	1	720	1200					1	20 A	R - COPIER 115A	2
3	R - INTAKE WORKSTATION 115A	20 A	1			180	360			1	20 A	R - WORK ROOM 115B	4
5	R - WORK ROOM 115B	20 A	1					300	180	1	20 A	R - WORK ROOM 115B - GARBAGE DISPOSAL	6
7	R - WORK ROOM 115B	20 A	1	360	500					1	20 A	M - ELEVATOR CAB LIGHT	8
9	R - MACH ROOM 114	20 A	1			180	180			1	20 A	R - MACH ROOM 114	10
11	R - ELEVATOR 1	20 A	1					180	720	1	20 A	R - LOBBY / CIRCULATION 100	12
13	R - LOBBY / CIRCULATION 100	20 A	1	540	540					1	20 A	R - MEDIA STORAGE 115C	14
15	R - LARGE GROUP STUDY 115D	20 A	1			720	360			1	20 A	R - MEDIA STORAGE 115C	16
17	R - PROJECTOR LARGE GROUP STUDY 115D	20 A	1					1000	180	1	20 A	R - FURNITURE SYSTEMS L. GROUP STUDY...	18
19	R - LARGE GROUP STUDY 115D	20 A	1	720	360					1	20 A	R - CLASSROOM 111	20
21	R - PROJECTOR CLASSROOM 111	20 A	1			1000	360			1	20 A	R - CLASSROOM 111	22
23	R - CLASSROOM 111	20 A	1					720	540	1	20 A	R - CLASSROOM 111	24
25	R - MOTORIZED SHADES GROUP STUDY 115D	20 A	1	500	540					1	20 A	R - CLASSROOM 111	26
27	R - MOTORIZED SHADES CLASSROOM 111	20 A	1			500	180			1	20 A	R - CLASSROOM 111	28
29	R - FIRE/SMOKE DAMPERS LOBBY 100	20 A	1					1200	904	1	20 A	L - LIGHTING 114, 115B, 115C, 115D & ELEV	30
31	SPARE	20 A	1	0	878					1	20 A	L - LIGHTING	32
33	SPARE	20 A	1			0	0			1	20 A	SPARE	34
35	SPARE	20 A	1					0	0	1	20 A	SPARE	36
37	SPARE	20 A	1	0	0					1	20 A	SPARE	38
39	SPARE	20 A	1			0	0			1	20 A	SPARE	40
41	SPARE	20 A	1					0	0	1	20 A	SPARE	42
				6858 VA		4020 VA		5924 VA					
				Ø A		Ø B		Ø C					

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
Other	1200 VA	100.00%	1200 VA
R - RECEPTACLE	13320 VA	87.54%	11660 VA
L - LIGHTING	2282 VA	125.00%	2853 VA

PANEL TOTALS	
TOTAL CONNECTED LOAD:	16802 VA
TOTAL CONNECTED CURRENT:	47 A
TOTAL ESTIMATED DEMAND LOAD:	15713 VA
TOTAL ESTIMATED DEMAND CURRENT:	44 A

PANEL: PT1A

VOLTS: 120/208 **PHASES:** 3 **WIRES:** 4 **MOUNTING:** SURFACE
LOCATION: BDF 112 **SUPPLY FROM:** MSA **KAIC:** 10KA **KASC:** 7.2KA
MAIN BREAKER: 200 A **AMP BUSSING:** 225 A **NEUTRAL BUS:** 225 A **IG BUS:**

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	CONVENIENCE OUTLET	20 A	1	180	180					1	20 A	OUTLET FOR AV SYSTEM	2
3	CONVENIENCE OUTLET	20 A	1			180	180			1	20 A	OUTLET FOR AV SYSTEM	4
5	CONVENIENCE OUTLET	20 A	1					180	90	2	30 A	R - RECEPTACLE BDF 112	6
7	208V DUPLEX ON TELECOM LADDER CABLE...	20 A	1	180	90					--	--	--	8
9	208V DUPLEX ON TELECOM LADDER CABLE...	20 A	1			180	90			2	30 A	R - RECEPTACLE BDF 112	10
11	208V DUPLEX ON TELECOM LADDER CABLE...	20 A	1					180	90	--	--	--	12
13	R - RECEPTACLE BDF 112	30 A	2	90	180					1	20 A	IDF - CONVENIENCE OUTLET ROOM 212	14
15	--	--	--			90	180			1	20 A	IDF - CONVENIENCE OUTLET ROOM 212	16
17	R - RECEPTACLE IDF ROOM 212	20 A	1					180	180	1	20 A	IDF - CONVENIENCE OUTLET ROOM 212	18
19	R - RECEPTACLE IDF ROOM 212	20 A	1	180	0					1	20 A	SPARE	20
21	208V DUPLEX ON TELECOM LADDER CABLE...	20 A	1			180	0			1	20 A	SPARE	22
23	208V DUPLEX ON TELECOM LADDER CABLE...	20 A	1					180	0	1	20 A	SPARE	24
25	R - RECEPTACLE IDF ROOM 212	30 A	2	90	0					1	20 A	SPARE	26
27	--	--	--			90	0			1	20 A	SPARE	28
29	R - RECEPTACLE IDF ROOM 212	30 A	2					90	0	1	20 A	SPARE	30
31	--	--	--	90	0					1	20 A	SPARE	32
33	SPARE	20 A	1			0	0			1	20 A	SPARE	34
35	SPARE	20 A	1					0	0	1	20 A	SPARE	36
37	SPACE	--	--	0	0					--	--	SPACE	38
39	SPACE	--	--			0	0			--	--	SPACE	40
41	SPACE	--	--					0	0	--	--	SPACE	42
				1260 VA		1170 VA		1170 VA					
				Ø A		Ø B		Ø C					

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
R - RECEPTACLE	3600 VA	100.00%	3600 VA

PANEL TOTALS	
TOTAL CONNECTED LOAD:	3600 VA
TOTAL CONNECTED CURRENT:	10 A
TOTAL ESTIMATED DEMAND LOAD:	3600 VA
TOTAL ESTIMATED DEMAND CURRENT:	10 A

LIGHTING CONTROL PANEL "LCP"

RELAY	LINE FEED	DIMMING	TYPE	VOLTAGE	SOURCE	DESCRIPTION	CONTROLLED BY
1	PP1A-29	YES	0-10V	120	NORMAL	P	TC,OR
2	PP1A-30	YES	0-10V	120	NORMAL	P, Q	TC,OR
3	PP1A-31	YES	0-10V	120	NORMAL	P	TC,OR
4	PP1A-32	YES	0-10V	120	NORMAL	P, Q	TC,OR
5	PP1A-33	YES	0-10V	120	NORMAL	R, V1, V2	TC,OR
6	PP1A-34	YES	0-10V	120	NORMAL	V1, V2	TC,OR
7							
8							
9							
10	EPL2A-33	YES	0-10V	120	EMERGENCY	P, Q	TC,OR
11	EPL2A-35	YES	0-10V	120	EMERGENCY	P, Q	TC,OR
12	EPL2A-36	YES	0-10V	120	EMERGENCY	P, Q	TC,OR
13							
14							
15							
16							
17							
18							
19							
20							
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25							
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27							
28							
29							
30							
31							
32							

TC= ASTRONOMICAL TIME CLOCK
OR= MANUAL OVERRIDE
OS= OCCUPANCY SENSOR

REFERENCE NOTES

1. PROVIDE JUNCTION BOX FOR 120V POWER CONNECTION TO SMOKE FIRE DAMPERS (SFD) (3/4"C, (2)#12, & (1)#12 GND). TO EACH SFD LOCATION. AT EACH SMOKE FIRE DAMPER PROVIDE A MANUAL MOTOR RATED SNAP SWITCH. REFER TO MECHANICAL PLANS FOR LOCATIONS AND NUMBER OF SFD'S. ROUTE CIRCUIT HOMERUN THROUGH CONTROL RELAY IN THE FACP. CONNECT MAX 1200 WATTS PER BRANCH CIRCUIT. PAINT JUNCTION BOX RED AND PROVIDE ENGRAVED PLACARD TO READ "FIRE DAMPERS ONLY".
2. PROVIDE RED HANDLE AND LOCK-ON DEVICE FOR ALL CIRCUITS FEEDING FIRE ALARM DEVICES, CABINETS OR EQUIPMENT. ALL CIRCUITS FEEDING FIRE ALARM DEVICES, CABINETS OR EQUIPMENT SHALL BE DEDICATED TO FIRE ALARM DEVICES ONLY. PROVIDE PLACARD TO READ "FIRE ALARM DEVICES".

PP1A	PP1B
PP1C	PP1D
PT1A	LCP

AGENCY APPROVAL:

REVIEWING AGENCIES STAMP HERE

Chaffey College

HMC Architects

5009006-000

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ONTARIO, CA 91764
909 989 9979 / www.hmcarchitects.com

ISSUE

Δ	DESCRIPTION	DATE
2	ADDENDUM 2	02.11.2022

KEYNOTES

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REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER P. MARCHESE
No. E-14506
REN. JUNE 30, 2022
ELECTRICAL
STATE OF CALIFORNIA

FACILITY:

CHAFFEY COLLEGE | CHINO CAMPUS
5897 COLLEGE PARK AVE.
CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

ELECTRICAL PANEL SCHEDULES

ADDENDUM #2

FILE NO.: **36-C1** A# : **04-119722**

DATE: **01.19.2022** CLIENT PROJ NO:

SHEET:

E7.01

BIM 360://5009 Chino Chaffey CC - Campus Projects/5009006000-MEP-CCCIB.rvt
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PLEASE RECYCLE

THE LINE SHOWN ABOVE IS 1" LONG ON ORIGINAL PLOT. IF NOT, ADJUST SCALE ACCORDINGLY

TELECOMMUNICATION SHEET SET

SEPARATION DISTANCE BETWEEN POWER CABLES AND DATA CABLES

CONDITION	MINIMUM SEPARATION DISTANCE		
	< 2 kVA	2-5 kVA	> 5kVA
UNSHIELDED POWER LINES OR ELECTRICAL EQUIPMENT IN PROXIMITY TO OPEN OR NONMETAL PATHWAYS.	5"	12"	24"
UNSHIELDED POWER LINES OR ELECTRICAL EQUIPMENT IN PROXIMITY TO A GROUNDED METAL CONDUIT PATHWAY.	2.5"	6"	12"
POWER LINES ENCLOSED IN A GROUNDED METAL CONDUIT (OR EQUIVALENT SHIELDING) IN PROXIMITY TO A GROUNDED METAL CONDUIT PATHWAY.		3"	6"
ELECTRICAL MOTORS AND TRANSFORMERS.			48"

SEPARATION DISTANCE BETWEEN DATA CABLES AND SPECIFIC EMI SOURCES

SOURCE OF DISTURBANCE	MINIMUM SEPARATION DISTANCE
FLUORESCENT LAMPS	5"
NEON LAMPS	5"
MERCURY VAPOUR LAMPS	5"
HIGH-INTENSITY DISCHARGE LAMPS	5"
ARC WELDERS	31"
FREQUENCY INDUCTION HEATING	39"

50' DISTANCE LIMIT RULE

A. IN NO CASE MUST A NON-LISTED OUTSIDE PLANT OR INCOMING SERVICE OUTDOOR RATED CABLE EXCEED 50 FEET FROM THE POINT OF ENTRANCE INTO ANY BUILDING. IF ON-SITE CONDITIONS RESULT IN A CASE WHERE THE CABLE EXCEEDS THE DISTANCE LIMIT THE CONTRACTOR MUST ADVISE A SOLUTION WITH THE PROJECT CONSULTANT. IN ALL CASES THE SOLUTION WOULD NEED TO INVOLVE EITHER TRANSITIONING FROM OUTDOOR NON-LISTED TO INDOOR LISTED CABLE VIA A SPLICE POINT (E.G. SPLICE CASE OR SPLICE ENCLOSURE FOR FIBER, PROTECTOR BLOCK FOR COPPER ETC.) OR THE ALTERNATIVE SHOULD BE TO ENCLOSE THE OUTDOOR RATED CABLE WITHIN INTERMEDIATE METAL CONDUIT (IMC) OR RIGID METAL CONDUIT (RMC) THAT IS PROPERLY SEALED AND BONDED TO A GROUNDING ELECTRODE. RETAINING THE OUTDOOR CABLE WITHIN CONDUIT SHOULD EFFECTIVELY EXTEND THE POINT OF ENTRANCE INTO THE BUILDING.

OSP DETECTION TAPE INCLUSION

A. IN ORDER TO REDUCE THE CHANCE OF ACCIDENTAL DIG-UP OF OUTSIDE PLANT DUCTBANK ELEMENTS IN THE FUTURE, PROVIDE A DETECTABLE WARNING TAPE CONTAINING METALLIC TRACINGS ALONG THE DUCTBANK PATH AT 12" BELOW GRADE MINIMUM. COLOR OF THE DETECTABLE TAPE SHALL BE ORANGE OR WHICHEVER COLOR THE COMMON GROUND ALLIANCE (CGA) HAS CURRENTLY DETERMINED FOR TELEVISION AND COMMUNITY ANTENNA TELEVISION (CATV) CABLES.

TELECOMMUNICATION SYMBOLS

SYMBOL	DESCRIPTION
E	ELEVATOR PHONE OUTLET - PROVIDE ONE ANALOG VOICE DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. ROUTE ONE 1.25" CONDUIT FROM ELEVATOR EQUIPMENT BOX TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. COORDINATE EXACT LOCATION WITH ELEVATOR VENDOR.
W	WALL PHONE OUTLET - PROVIDE ONE DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT AT 54" AFF UNLESS NOTED OTHERWISE.
	WALL STANDARD COMMUNICATION OUTLET - PROVIDE THREE DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT AT PROJECT'S STANDARD RECEPTACLE HEIGHT UNLESS NOTED OTHERWISE.
	FLOOR STANDARD COMMUNICATION OUTLET - PROVIDE THREE DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT IN FLOOR BOX. EXACT LOCATION TO BE COORDINATED BY ARCHITECT.
WAP	WIRELESS COMMUNICATION OUTLET (ACCESSIBLE CEILING) - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. COIL ADDITIONAL 15 FEET OF CABLE FOR RELOCATION OF OUTLET AFTER WIRELESS SITE SURVEY (BY OTHERS) IS COMPLETE. MOUNT ABOVE CEILING. PROVIDE ONE 1.25" CONDUIT FROM LOCATION TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY.
WAP1	WIRELESS COMMUNICATION OUTLET (HARD LID CEILING) - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY.
WAP	WALL WIRELESS COMMUNICATION OUTLET - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT AT 120" AFF UNLESS NOTED OTHERWISE.
XD	WALL DATA COMMUNICATION OUTLET - PROVIDE QUANTITY OF DROPS AS INDICATED BY SUBSCRIPT COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGL GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT AT 18" AFF UNLESS NOTED OTHERWISE.
XD	FLOOR DATA COMMUNICATION OUTLET - PROVIDE QUANTITY OF DROPS AS INDICATED BY SUBSCRIPT COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT IN FLOOR BOX. EXACT LOCATION TO BE COORDINATED BY ARCHITECT.
FP	DATA COMMUNICATION OUTLET AT FLAT PANEL DISPLAY LOCATION - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. MOUNTED IN FLAT PANEL IN-WALL BACKBOX. SEE EAV DRAWINGS FOR INFORMATION OF THE FLAT PANEL IN-WALL BACKBOX. STUB ONE 1.25" CONDUIT TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY.
FP	CEILING DATA COMMUNICATION OUTLET AT FLAT PANEL DISPLAY LOCATION - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. MOUNT FLUSH IN CEILING.
CP	DATA FOR AV ROOM CONTROL PANEL - PROVIDE ONE DATA DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. NO FACEPLATE. STUB ONE 1" CONDUIT FROM AV BACKBOX TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. SEE EAV DRAWINGS FOR INFORMATION OF THE AV BACKBOX.
RS	DATA FOR AV ROOM SCHEDULING PANEL - PROVIDE ONE DATA DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. NO FACEPLATE. TERMINATE WITH MODULAR JACK IN AV BACKBOX OR CUTOUT FOR GROMMET IN ARCHITECTURAL MULLION. STUB ONE 1" CONDUIT FROM AV BACKBOX OR FROM ARCHITECTURAL MULLION TOABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. SEE EAV DRAWINGS FOR INFORMATION OF THE AV BACKBOX.
F	SYSTEM FURNITURE STANDARD COMMUNICATION OUTLET - PROVIDE THREE DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. COORDINATE WITH THE ARCHITECT AND FURNITURE CONSULTANT FOR MOUNTING HEIGHT.
P	CEILING DATA COMMUNICATION OUTLET FOR PROJECTOR - PROVIDE ONE DATA DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY.
CAM	CEILING DATA COMMUNICATION OUTLET FOR SECURITY CAMERA - PROVIDE ONE DATA DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. COORDINATE WITH ARCHITECT AND SECURITY CONSULTANT FOR EXACT LOCATION.
CAM	WALL DATA COMMUNICATION OUTLET FOR SECURITY CAMERA - PROVIDE ONE DATA DROP COMPLETE WITH CAT6 CABLE, CONNECTOR AND TERMINATION AS REQUIRED. STUB ONE 1.25" CONDUIT FROM DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING TO ABOVE ACCESSIBLE CEILING ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. ROUTE CABLES VIA J-HOOKS THROUGH CONDUIT SLEEVES TO CABLE TRAY. COORDINATE WITH ARCHITECT AND SECURITY CONSULTANT FOR EXACT LOCATION.
EP	FIBER COMMUNICATION OUTLET FOR BLUEPHONE - PROVIDE 2-STRAND MULTIMODE OM4 COMPLETE WITH CONNECTOR AND TERMINATION AS REQUIRED. PROVIDE ONE 1.25" CONDUIT. COORDINATE WITH ARCHITECT AND SECURITY CONSULTANT FOR EXACT LOCATION.
F1	SYSTEM FURNITURE COMMUNICATION OUTLET - PROVIDE TWO DATA DROPS COMPLETE WITH CAT6 CABLES, CONNECTORS AND TERMINATIONS AS REQUIRED. COORDINATE WITH THE ARCHITECT AND FURNITURE CONSULTANT FOR MOUNTING HEIGHT.
FF	FURNITURE FEED FLOOR BOX DEVICE WITH FURNITURE FEED COVER. PROVIDE ONE 1.25" CONDUIT TO CABLE TRAY ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. EXACT LOCATION TO BE COORDINATED BY ARCHITECT.
PT1	FURNITURE FEED POKE-THRU DEVICE WITH FURNITURE FEED COVER. PROVIDE ONE 1.25" CONDUIT TO CABLE TRAY ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. EXACT LOCATION TO BE COORDINATED BY ARCHITECT.
J1	4"x4"x4" JUNCTION BOX. PROVIDE ONE 1.25" CONDUIT TO CABLE TRAY ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. MOUNT AT PROJECT'S STANDARD RECEPTACLE HEIGHT UNLESS NOTED OTHERWISE.
J2	6"x6"x4" JUNCTION BOX. PROVIDE ONE 2" CONDUIT TO CABLE TRAY ON THE SAME FLOOR AS SHOWN UNLESS NOTED OTHERWISE. MOUNT AT PROJECT'S STANDARD RECEPTACLE HEIGHT UNLESS NOTED OTHERWISE.
	19" TELECOMMUNICATIONS RACK.
	TELECOMMUNICATIONS GROUND BUS BAR.
	FIRE RETARDANT .75" PLYWOOD BACKBOARD. PAINTED WITH TWO COATS OF WHITE FIRE RETARDANT PAINT PRIOR TO INSTALLATION. EACH SHEET OF PLYWOOD BACKBOARD SHALL BE 4' WIDE X 8' HIGH.
	TELECOMMUNICATIONS BASKET CABLE TRAY, 12" WIDE x 4" DEEP, UNO. MOUNT ABOVE ACCESSIBLE CEILING. COORDINATE LOCATION WITH DUCTWORK, PLUMBING, FIRE PROTECTION, ELECTRICAL, AND LIGHT FIXTURES.
	TELECOMMUNICATIONS LADDER CABLE RUNWAY. SIZE AS INDICATED ON DRAWINGS.
	EMT CONDUIT CONCEALED IN SLAB OR UNDER FINISHED FLOOR. ROUTE AS INDICATED.
	EMT CONDUIT CONCEALED IN WALL OR ABOVE FINISHED CEILING. ROUTE AS INDICATED.
	EMT CONDUIT STUB UP INTO ACCESSIBLE CEILING UNLESS NOTED OTHERWISE.
	CONDUIT ABOVE CEILING UNLESS NOTED OTHERWISE. CONDUIT SHALL BE CONCEALED.
AFF	ABOVE FINISHED FLOOR
BFC	BELOW FINISHED CEILING
UNO	UNLESS NOTED OTHERWISE
TR	TELECOMMUNICATION ROOM
ER	EQUIPMENT ROOM
TGB	TELECOMMUNICATION GROUNDING BUSBAR
TMGB	TELECOMMUNICATION MAIN GROUNDING BUSBAR
TBB	TELECOMMUNICATION BONDING BACKBONE

CONDUIT INSTALLATION NOTES

THE RACEWAY SYSTEM FOR TELECOM CABLE SHALL FOLLOW THE NEC AND ALL LOCAL CODES GOVERNING THIS PROJECT. ADDITIONAL REQUIREMENTS ARE AS FOLLOWS:

1. A PULL CORD (NYLON, 1/8" MINIMUM) SHALL BE INSTALLED WITHIN ALL CONDUITS.
2. A PULL ROPE (NYLON/POLYESTER, 3/8" MINIMUM) SHALL BE INSTALLED WITHIN ALL OUTSIDE PLANT CONDUITS. MINIMUM TENSILE STRENGTH OF ROPE SHALL BE 2000 LBS PER FOOT.
3. PULL CORD AND PULL ROPE WITHIN ALL CONDUITS SHALL BE RE-PULLED AFTER EACH USE. CONDUITS SHALL NOT REMAIN EMPTY.
4. CONDUIT SHALL RUN IN MOST DIRECT ROUTE POSSIBLE, USUALLY PARALLEL WITH BUILDING LINES.
5. CONDUIT SLEEVES SHOULD BE RIGID GALVANIZED STEEL FOR PENETRATIONS OF CONCRETE SLABS, CONCRETE WALLS. ALL SLEEVES SHALL BE RIGIDLY INSTALLED USING APPROPRIATE FITTINGS AND ALL PENETRATIONS SHALL BE GROUTED AROUND THE SLEEVE. SLEEVES SHALL PROJECT A MINIMUM OF 4" BEYOND WALL OR FLOOR SURFACE. ALL PENETRATIONS SHALL BE FIRESTOPPED.
6. CONDUIT RUN SHALL CONTAIN NO CONTINUOUS SECTIONS LONGER THAN 100 FEET. IF RUNS TOTAL MORE THAN 100 FEET, PULL POINTS OR PULL BOXES SHALL BE INSERTED.
7. CONDUIT RUNS TO WORK AREAS SHALL SERVE NO MORE THAN ONE COMMUNICATION OUTLET. DAISY CHAINING IS NEVER ALLOWED.
8. CONDUIT SHALL HAVE NO MORE THAN TWO 90 DEGREES OF BENDS AT ANY POINT OR MORE THAN 180 DEGREES OF CUMULATIVE BENDS BETWEEN PULL POINTS.
9. INSTALL CONDUITS WITH A MINIMUM OF BENDS AND OFFSETS. BENDS SHALL NOT KINK OR DESTROY INTERIOR CROSS SECTION OF RACEWAY. FACTORY MADE BENDS SHALL BE USED FOR RACEWAY'S 1" TRADE SIZE AND LARGER. BENDS RADIUS SHALL BE 6 TIMES INTERNAL DIAMETER FOR CONDUIT SIZES UP TO 2". A CONDUIT GREATER THAN 2" SHALL HAVE BEND RADIUS AT LEAST 10 TIMES DIAMETER OF CONDUIT. DO NOT USE PULL BOX IN LIEU OF A BEND RADIUS. BEND RADIUS ON CABLING SHOULD ALWAYS BE MADE WITHIN THE CONDUIT.
10. DO NOT INSTALL CONDUIT OVER OR ADJACENT TO BOILERS, INCINERATORS, HOT WATER LINES, OR STEAM LINES.
11. REAM ALL CONDUIT ENDS AND FIT THEM WITH AN INSULATED BUSHING TO ELIMINATE SHARP EDGES THAT MAY DAMAGE CABLES.
12. AFTER INSTALLATION, LEAVE CONDUITS CLEAN, DRY AND UNOBSTRUCTED, REAMED AND FITTED WITH BUSHINGS.
13. ELECTRICAL METALLIC TUBING AND RIGID METAL CONDUIT ARE THE ONLY ALLOWED TYPES FOR INTERIOR BUILDING. FLEXIBLE METAL CONDUIT IS NEVER ALLOWED.
14. CONDUIT SYSTEM INSTALLATION:
    - 14.1 CABLE IN EXTERIOR, ABOVE GRADE LOCATIONS: RIGID GALVANIZED STEEL.
    - 14.2 INTERIOR LOCATIONS: EMT AND RMC.
    - 14.3 CABLE BELOW GRADE: SCHEDULE 40 PVC.
15. ALL METALLIC CONDUITS SHALL BE APPROPRIATELY GROUNDED AS SPECIFIED IN THE NEC, ANSI/TIA/EIA J-STD-607-B AND PER MANUFACTURER'S SPECIFICATIONS.
16. CONDUITS ARE TO BE CLEARLY MARKED AT EACH END TO INDICATE THE TRADE (E.G. AV, TELECOM) THAT THE CONDUIT IS INTENDED TO SUPPORT.
17. CABLE PATHWAY SHOULD BE LESS THAN 270 FEET. THE LENGTH SHALL BE MEASURED FROM THE OUTLET IN THE WORK AREA TO PATCH PANEL IN THE RACK.
18. FOR OUTSIDE PLANT CONDUITS ROUTES PROVIDE A SITE LEVEL ACCESSIBLE HANDHOLE EVERY (2) 90 DEGREE BENDS OR 180 DEGREES IN BENDS TOTAL. DISTANCE BETWEEN EACH HANDHOLE SHALL NOT EXCEED 600 FEET DISTANCE. DO NOT USE HANDHOLE IN LIEU OF A BEND RADIUS. BEND RADIUS ON CABLING SHOULD ALWAYS BE MADE WITHIN THE CONDUIT.
19. OUTSIDE PLANT LOCATIONS, ROUTES, AND PULL POINTS ARE INDICATIVE ONLY. CONTRACTOR TO REVIEW THE PROJECT SITE AND SUBMIT SHOP DRAWING WHICH INCLUDES BUT IS NOT LIMITED TO ROUTES, CONFIGURATION OF CONDUITS, AND DESIGN OF HANDHOLES AND MANHOLES FOR REVIEW BY THE DESIGN TEAM BEFORE COMMENCING WORK.
20. CONTRACTOR TO SUBMIT PRE-CAST HANDHOLE AND MANHOLE PRODUCTS WHICH ARE TO BE INTEGRATED INTO THE OUTSIDE PLANT COMMUNICATIONS DUCTBANK FOR REVIEW BEFORE COMMENCING WORK.
21. CONSTRACTOR SHALL PROVIDE A 2" CONDUIT SLEEVES EXTENDING INTO ACCESSIBLE CEILING AS NECESSARY INTO AREAS AND ROOMS WHERE OUTLET CONDUITS CANNOT EXTEND INTO THE ADJACENT CORRIDOR.

GENERAL PROJECT NOTES

A. ALL MOUNTING HEIGHTS ARE TO THE CENTER LINE OF THE DEVICE BACKBOX UNLESS NOTED OTHERWISE.

B. ALL BOXES AND CONDUITS IN WALLS AND CEILINGS SHALL BE FLUSH MOUNTED OR CONCEALED UNLESS NOTED OTHERWISE.

C. ALL EXTERIOR OUTLETS SHALL BE EXTERIOR RATED OUTLET, IP-67 RATED (NEMA 6).

D. EXACT LOCATION OF ALL TELECOM OUTLETS LOCATED IN FURNITURE AND MILLWORK TO BE VERIFIED WITH ARCHITECT PRIOR TO INSTALLATION.

E. ELECTRICAL OUTLETS SHALL BE PROVIDED WITHIN THREE-SIX INCHES OF COMMUNICATION OUTLETS AT EQUAL HEIGHT.

F. IT SHALL BE UNDERSTOOD ALL INFORMATION WITHIN THIS DRAWING PACKAGE IS DIAGRAMMATIC TO SHOW THE DESIGN INTENT. ANY FIELD DEVIATIONS FROM THE DRAWINGS BY THE CONTRACTOR HOWEVER, SHALL BE SUBMITTED IN WRITING TO THE ARCHITECT OR CONSULTANT. IF FIELD DEVIATIONS ARE NOT SUBMITTED BEFOREHAND, THE INDIVIDUAL CHANGE(S) WILL BE CONSIDERED OUT OF SCOPE FROM THE ARCHITECT AND CONSULTANT'S OVERALL DESIGN AND SPECIFICATION FOR THE PROJECT.

AGENCY APPROVAL:

Chaffey College

HMC Architects

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ISSUE

Δ	DESCRIPTION	DATE
1	DSA APPROVAL	06.17.2021
2	ADDENDUM 2	02.11.2022

KEYNOTES

NOTES

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FACILITY:

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

TELECOM SYMBOLS AND NOTES

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

SHEET:

T000

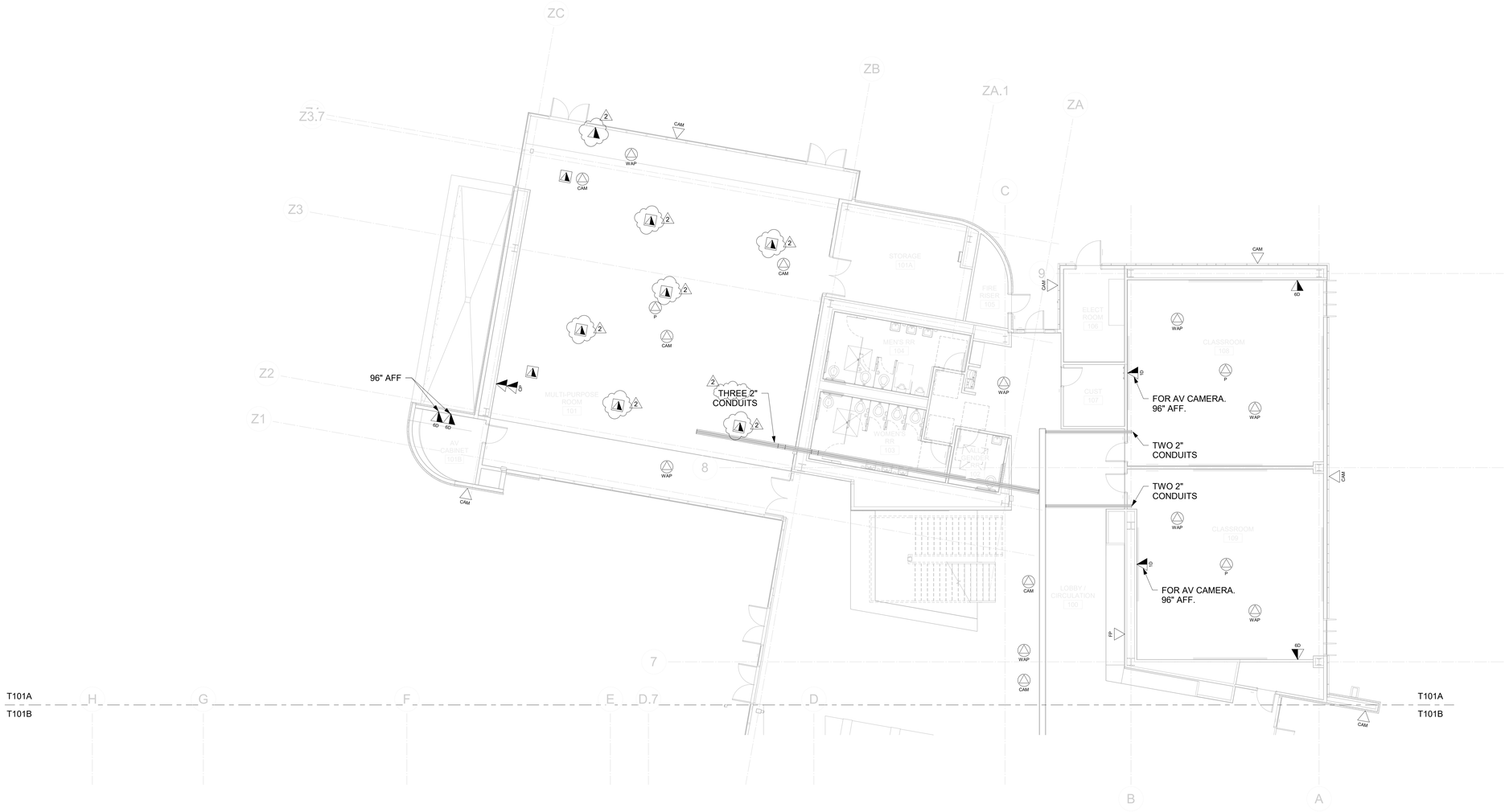
2/9/2022 9:04:14 AM

PLEASE RECYCLE

THE LINE SHOWN ABOVE IS EXACTLY ONE INCH LONG ON THIS SHEET'S ORIGINAL SPACE SIZE

NOTES (THIS SHEET ONLY):

A. ALL OUTLETS ON THIS FLOOR ARE SERVED FROM BDF 112. TERMINATE ALL CABLES IN BDF 112.



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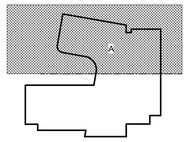
KEY PLAN:



FACILITY:

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

TELECOM 1ST FLOOR PLAN - SEGMENT A

ADDENDUM #2

FILE NO.: 36-C1 **A# : 04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

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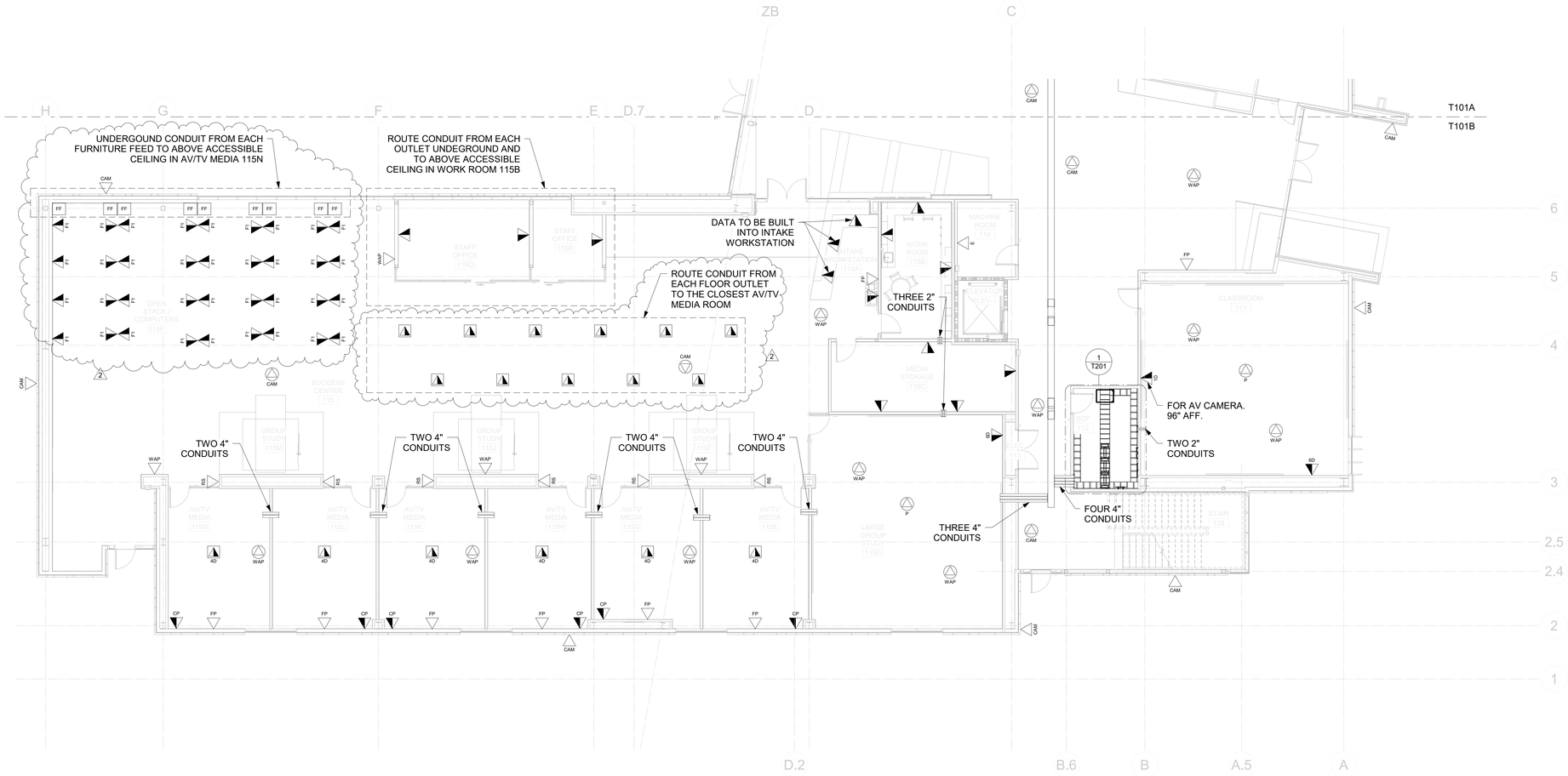

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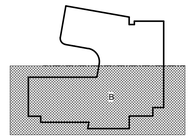
KEY PLAN:



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CHINO, CA 91710

PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

TELECOM 1ST FLOOR PLAN - SEGMENT B

ADDENDUM #2

FILE NO.: **36-C1** A# : **04-119722**

DATE: **06.17.2021** CLIENT PROJ NO:

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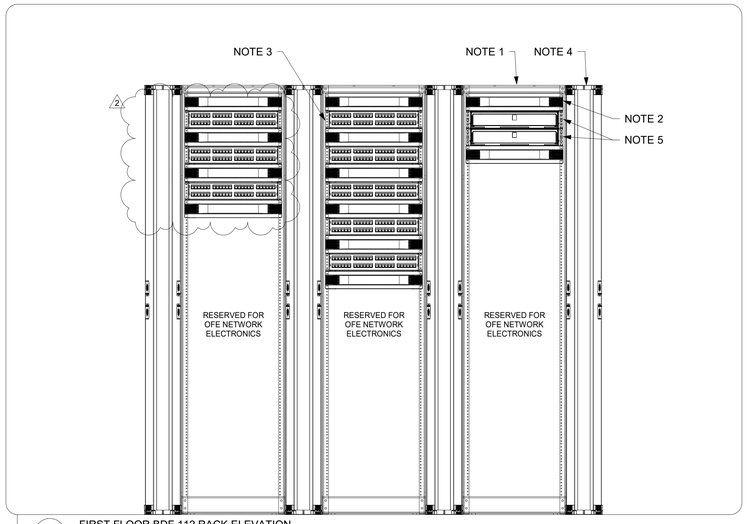
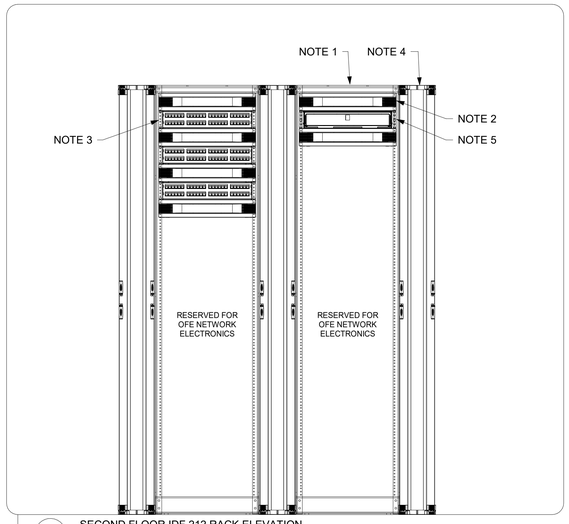


1 FIRST FLOOR BDF 112 RACK ELEVATION
NTS



2 SECOND FLOOR IDF 212 RACK ELEVATION
NTS

SHEET NOTES (THIS SHEET ONLY)

1. TELECOMMUNICATION EQUIPMENT RACK.
2. HORIZONTAL CABLE MANAGEMENT.
3. 48-PORT DATA PATCH PANEL.
4. 6" DOUBLE SIDED VERTICAL CABLE MANAGEMENT.
5. FIBER OPTIC PATCH PANEL.

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PROJECT:

CHINO INSTRUCTIONAL BUILDING

SHEET NAME:

TELECOM RACK ELEVATIONS

ADDENDUM #2

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