Santa Maria-Bonita School District
CULTIVATING BRIGHT FUTURES

ADDENDUM NO. 2

Bid No. 5384
BATTLES ELEMENTARY SCHOOL NEW TK-K BUILDING AND SITE UPGRADES

Date of Addendum:	April 8, 2025
Bid Opening Date Remains:	April 23, 2025

Plans, Specifications, and Drawings- Changes are as follows (in RED):

The attached DLR Group's Architect Addendum No. 1 is hereby incorporated into the Bid Documents.

ALL OTHER REQUIREMENTS, TERMS, AND CONDITIONS REMAIN THE SAME

DLR Group inc.
a California corporation

700 South Flower Street, 22nd Floor
Los Angeles, CA 90017

April 4, 2025

ADDENDUM 01

Pre-Bid Revision for Contractors' Incorporation into:

Battles ES – TK/K Building and Site Upgrades
Santa Maria-Bonita School District

DSA Application No:	03-124614
File No.	42-48
DLR Group Project No.:	75-24119-00

Prepared By:	DLR Group 700 South Flower Street, 22nd Floor Los Angeles, CA 90017 (213) 800-9400

NOTICE TO BIDDERS:

The following changes, deletions, additions and/or alterations in, on and to the drawings shall apply to proposals made for and to the execution of the various parts of the work affected thereby.
Careful note of this addendum shall be taken by all parties of interest so that the proper allowance may be made in all computations, estimates, and contracts, and all trades affected shall be fully advised in the performance of the work which will be required of them.

The following revisions are being made to the Bidding Documents to the above referenced project:

A. PROJECT MANUAL - Narrative of Changes

1. SECTION 00 01 10 – TABLE OF CONTENTS

A. Noted section 09 68 13 was revised to OFCI through this Addendum.
*B. REVISED title of specification section 12 24 00 to Window **Roller** Shades. Noted section was replaced.*
*C. REVISED title of specification section 26 09 23 to Lighting Control **Systems and** Devices. Noted section was replaced.*
D. Noted section 26 33 23.11 was replaced through this Addendum.
E. ADDED new specification section 27 00 05 under Division 27 – Communications.
F. ADDED new specification section 27 05 26 under Division 27 – Communications.
G. ADDED new specification section 27 05 27 under Division 27 – Communications.
H. ADDED new specification section 27 05 28 under Division 27 – Communications.
I. ADDED new specification section 27 13 05 under Division 27 – Communications.
J. ADDED new specification section 27 15 05 under Division 27 – Communications.

2. SECTION 09 68 13 – TILE CARPETING

A. Revised specification to indicate products as OFCI (Owner Furnished, Contractor Installed).

3. SECTION 12 24 00 – WINDOW ROLLER SHADES

A. Revised specification Basis of Design to Mecho/7.

4. SECTION 26 09 23 – LIGHTING CONTROL SYSTEMS AND DEVICES
   B. REPLACED specification section in its entirety.

5. SECTION 26 33 23.11 – CENTRAL BATTERY EQUIPMENT FOR EMERGENCY LIGHTING
   C. REVISED Part 2 Products, Item 2.2, A. Added four additional Manufacturers.

6. SECTION 27 00 05 – SPECIAL CONDITIONS FOR COMMUNICATIONS SYSTEMS
   A. ADDED new specification section in its entirety.

7. SECTION 27 05 26 – GROUNDING BONDING FOR COMMUNICATIONS SYSTEMS
   A. ADDED new specification section in its entirety.

8. SECTION 27 05 27 – EXTERIOR PATHWAYS FOR COMMUNICATIONS SYSTEMS
   A. ADDED new specification section in its entirety.

9. SECTION 27 05 28 – INTERIOR PATHWAYS FOR COMMUNICATIONS SYSTEMS
   A. ADDED new specification section in its entirety.

10. SECTION 27 13 05 – COMMUNICATION SINGLE MODE FIBER OPTIC CABLING
    A. ADDED new specification section in its entirety.

11. SECTION 27 15 05 – COMMUNICATION CABLING CAT6A
    A. ADDED new specification section in its entirety.

12. APPENDIX 01
    A. ADDED new Appendix 01 –
        a. SOILS ENGINEERING REPORT – NEW TK/K BUILDING AND SITE IMPROVEMENTS BATTLES ELEMENTARY SCHOOL, dated June 11, 2024. Project GS00433-1.
        b. RFI NO. 1 – RECOMMENDATIONS FOR CONCRETE DRIVE AISLES – NEW TK/K BUILDING AND SITE IMPROVEMENTS BATTLES ELEMENTARY SCHOOL, dated July 23, 2024. Project GS00433-1.
        c. RFI NO. 2 – RECOMMENDATIONS FOR CAST-IN-PLACE DRILLED PIER FOOTINGS – NEW TK/K BUILDING AND SITE IMPROVEMENTS BATTLES ELEMENTARY SCHOOL, dated July 23, 2024. Project GS00433-1.

APPENDIX 02
    A. ADDED new Appendix 02 –
        a. GEOLOGIC HAZARD ASSESSMENT – NEW TK/K BUILDING AND SITE IMPROVEMENTS BATTLES ELEMENTARY SCHOOL, dated August 29, 2024. Project GS00433-2.

B. DRAWINGS – Narrative of Changes

1. OFF-SITE IMPROVEMENT PLANS FOR SANTA MARIA-BONITA SCHOOL DISTRICT, BATTLES ELEMENTARY SCHOOL ARE HEREBY ADDED TO THE CONSTRUCTION DOCUMENTS
   A. NEW SHEET ADDED in its entirety – COVER SHEET AND GENERAL NOTES, Sheet 1 of 4 sheets.
   B. NEW SHEET ADDED in its entirety – BATTLES ROAD STREET IMPROVEMENTS, Sheet 2 of 4 sheets.
   C. NEW SHEET ADDED in its entirety – BATTLES ROAD STREET IMPROVEMENTS, Sheet 3 of 4 sheets.
   D. NEW SHEET ADDED in its entirety – WATER IMPROVEMENT PLAN, Sheet 4 of 4 sheets.

2. SHEET C5.0 – UTILITY PLAN

A. *Addition of 10" water main relocation per separate permit.*
B. *Revision to water connection at Battles Road.*
C. *Revision to sewer and water connection at west side of site.*
D. *Revision to fire water connection and backflow preventor location.*
E. *Addition of keynotes W8, W9.*
F. *Revision of keynotes S2, F6.*

3. SHEET A10.1 – INTERIOR ELEVATIONS
   A. *Interior Elevations 4 & 7/A10.1 updated layout of monitors, markerboards and added projectors.*
   B. *Reference keynotes LCD TV, STP added to sheet. Note added regarding Projectors, Monitors, and White Boards to be installed at all classrooms.*

4. SHEET A12.10 – FINISH SCHEDULES
   C. *WM-1 and CPT-1 indicated to be OFCI.*
   D. *WS-1 revised to MECHO/7. All window treatments updated to indicate multiband shades at all locations.*

5. SHEET P2.1 – PLUMBING FLOOR PLAN
   E. *Extended new site gas line to revise POC to existing gas line.*

6. SHEET E0.1 – ELECTRICAL SYMBOLS, ABBREVIATIONS, NOTES
   A. *Added new sheet E6.4 to Sheet Index*
   B. *Revised sheet E2.1 title to Power and Systems Plan*
   C. *Revised Communications and Security symbols legends.*

7. SHEET ES1.1 – ELECTRICAL SITE PLAN
   A. *Added grounding loop and grounding notes 19, 20, 21 and 22.*
   B. *Added location of new transformer TC.*
   C. *Revised internet/fiber optic service entrance route and note 17.*
   D. *Revised note 8 to add detection loop at parking lot exit.*
   E. *Revised note 13 to add an additional 4" low voltage conduit between buildings.*
   F. *Revised note 14 to delete card readers.*

8. SHEET E2.1 – POWER AND SYSTEMS PLAN
   A. *Revised sheet title to Power and Systems Plan*
   B. *Revised general note 14 and added Telecom/Data scope.*
   C. *Indicated number of required ports at all data outlets.*
   D. *Added note 12 and clock/paging system.*
   E. *Added note 13 and Telecom/Data head end equipment.*
   F. *Added note 14 and intrusion detection system devices.*
   G. *Added note 15 and wireless access points.*
   H. *Changed controlled/switched duplex receptacles in classrooms to unswitched.*

9. SHEET E5.1 – ONE-LINE DIAGRAM
   A. *Clarified main circuit breaker rating on MSA.*
   B. *Added transformer TC feeding the existing exterior switchboard.*
   C. *Revised circuit breaker, primary/secondary feeders, and SCCR/voltage drop calculations associated with transformer TC.*
   D. *Adjusted lighting inverter specification in note 12.*

10. SHEET E6.1 – ELECTRICAL DETAILS - GROUNDING
    A. *Revised grounding detail 4/E6.1.*

11. SHEET E6.2 – ELECTRICAL DETAILS

A. Added Telecom/Data details 21/E6.2 and 22/E6.2.
B. Deleted card reader detail 17/E6.2.

12. SHEET E6.4 – ELECTRICAL DETAILS

A. NEW SHEET ADDED in its entirety.
B. Added new sheet E6.4 for Telecom/Data headend equipment mounting details.

13. SHEET E7.1 – ELECTRICAL SCHEDULES

A. Added transformer TC to Electrical Equipment Schedule.

14. SHEET FP1.1 – UNDERGROUND SITE FIRE PIPING PLAN

B. Revised underground site fire piping plan.

C. GENERAL CLARIFICATIONS

1. ASK-001 – SUMMER 2025 WORK – EXHIBIT IS HEREBY ADDED TO THE CONSTRUCTION DOCUMENTS; Parking lot and utility scope work indicated in ASK-001A through ASK-001F to be completed during Summer 2025 for fully functional and operational school by August 2025. Contractor to schedule and coordinate accordingly.

A. NEW SHEET ADDED – ASK-001A
B. NEW SHEET ADDED – ASK-001B
C. NEW SHEET ADDED – ASK-001C
D. NEW SHEET ADDED – ASK-001D
E. NEW SHEET ADDED – ASK-001E
F. NEW SHEET ADDED – ASK-001F

INCLUDED ATTACHMENTS:

Drawings: OFF-SITE IMPROVEMENT PLANS FOR SANTA MARIA-BONITA SCHOOL DISTRICT BATTLES ELEMENTARY SCHOOL (SHEETS 1 through 4); C5.0, A10.1, A12.0, P2.1, E0.1, ES1.1, E2.1, E5.1, E6.1, E6.2, E6.4, E7.1, FP1.1;
Specification Sections: 00 01 10, 09 68 13, 12 24 00, 26 09 23, 26 33 23.11, 27 00 05, 27 05 26, 27 05 27, 27 05 28, 27 15 05;
Sketches: ASK-001 (A through F)
Reports:

- *SOILS ENGINEERING REPORT – NEW TK/K BUILDING AND SITE IMPROVEMENTS BATTLES ELEMENTARY SCHOOL, dated June 11, 2024. Project GS00433-1;*
- *RFI NO. 1 – RECOMMENDATIONS FOR CONCRETE DRIVE AISLES – NEW TK/K BUILDING AND SITE IMPROVEMENTS BATTLES ELEMENTARY SCHOOL, dated July 23, 2024. Project GS00433-1;*
- *RFI NO. 2 – RECOMMENDATIONS FOR CAST-IN-PLACE DRILLED PIER FOOTINGS – NEW TK/K BUILDING AND SITE IMPROVEMENTS BATTLES ELEMENTARY SCHOOL, dated July 23, 2024. Project GS00433-1;*
- *GEOLOGIC HAZARD ASSESSMENT – NEW TK/K BUILDING AND SITE IMPROVEMENTS BATTLES ELEMENTARY SCHOOL, dated August 29, 2024. Project GS00433-2*

**** END OF ADDENDUM 01 ****

SECTION 00 01 10
TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS

SPECIFICATIONS

END OF SECTION

SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered. CPT-1**, OFCI**

B. Carpet tile walk-off mat. WM-1**, OFCI**

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 74 19 - Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap and removed carpet tile.

C. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

D. Section 09 6500 - Resilient Flooring: Topset Base.

1.03 REFERENCE STANDARDS

A. AATCC Test Method 134 - Test Method for Electrostatic Propensity of Carpets.

B. AATCC Test Method 16 - Colorfastness to Light.

C. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.

D. ASTM D5848 - Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Coverings.

E. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

F. CRI 104 - Standard for Installation of Commercial Carpet.

G. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

C. Shop Drawings: Indicate layout of joints.

D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

E. Submit two, 6 inch long samples of edge strip and base cap.

F. Manufacturer's Installation Instructions: Indicate special procedures.

G. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

H. Installer's Qualification Statement.

I. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

J. Maintenance Materials: Furnish the following for District's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

1. Store inside, in well ventilated area, protected from weather, moisture and soiling. Store rolls flat, not standing on end.

B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.

C. Deliver carpet materials in original mill protective wrapping with mill register numbers and tags attached.

D. Ventilate installation area during installation and for 72 hours after installation.

1.07 WARRANTY

A. Carpet Warranty: Provide 10-year Commercial Limited Warranty.

B. Extended Warranty: Provide extended warranty covering edge raveling, delamination and wear exceeding 10 percent of face yarn weight for a period of 15 years after “Notice of Completion”.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. All products used for flooring installation shall comply with flammability and smoke classifications for various locations of installation. Comply with applicable requirements of California Building Code (CBC) Chapter 8.

B. Provide glue-down installation conforming to CBC Section 11B-302.2.

1. Carpet shall be securly attached and shall have a firm cushion. pad, or backing or no cushion or pad.
   a. Carpet shall have level loop, textured loop, level cut or level cut/uncut pile texture.
   b. Pile height shall be 1/2 inch maximum.
2. Exposed edges shall be fastened to floor surfaces and shall have trim on the entire length.
   a. Carpet edges shall comply with CBC Section 11B-303.

C. Comply with CalGreen Building Standards: All installed carpeting shall be low VOC emissions listed. Certified as Low Emission by one of the following:

1. Carpet and Rug Institute's Green Label Plus Program. CalGreen 5.504.4.4.1

2. Compliant with the VOC emission limits and testing requirements specified in the California Department of Public Health's "Standard Method for the Testing and Evaluation Chambers", Version 1.1, February 2010 or Specification 01350. CalGreen 5.504.4.4.2.
3. NSF/ANSI 140 at Gold level or higher. CalGreen 5.504.4.4.3
4. SCS Floorscore; www.scscertified.com. CalGreen 5.504.4.4.4.
5. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product Database; www.chps.net/manual/lem_table.htm. CalGreen 5.504.4.4.5.

2.02 MANUFACTURERS

A. Tile Carpeting:
1. Mohawk Group: www.mohawkgroup.com/#sle.
2. Shaw Industries Group, Inc.: www.shawcontract.com.
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 MATERIALS

A. **OFCI** Carpet Tile (Entry or "Walk-Off" Mat)
1. Carpet, Type WM-1: Tufted Tip-Sheared, nylon.
a. Basis of Design Product: Indicated on Drawings as manufactured by Mohawk Group or Shaw Industries Group, Inc, or approved equal.
b. Critical Radiant Flux: Minimum of 0.45 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
c. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
d. VOC Content: Comply with Section 01 61 16.
e. Maximum Electrostatic Charge: 3.5 Kv. at 20 percent relative humidity (RH).
f. Primary Backing: AFIRMA II Hardback Tile.
1) Material: Synthetic.
g. Tile Size: 24 by 24 inch, nominal.
h. Yarn Weight: 24 oz/sq yd, ASTM D5848.
i. Pile Height: 0.090 to 0.198 inch.
j. Color: As indicated on Drawings.
2. Preferred Manufacture Location: California.
3. Recycling:
a. New Carpet:
1) Carpet must be eligible for recycling by the supplying mill or fiber producer to an existing operational third party certified recycling center;
2) Submit program parameters.
3) Landfills are not an option.

B. **OFCI,** Tile Carpeting, Type CPT-1: Tufted, Textured Loop, manufactured in one color dye lot.

1. Basis of Design Product: Indicated on Drawings as manufactured by Mohawk Group or Shaw Industries Group, Inc, or approved equal.
2. Tile Size: 24 by 24 inch, nominal.
3. Thickness: 0.35 inch.
4. Color: As indicated on Drawings.
5. Pattern: Linear.
6. Critical Radiant Flux: Minimum of 0.45 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
7. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
8. VOC Content: Comply with Section 01 61 16.
9. Indoor Air Quality—CRI Green Label Plus™
10. Antimicrobial: Yes.
11. Maximum Electrostatic Charge: 3.5 Kv. at 20 percent relative humidity, AATCC Test Method 134.
12. Light Fastness: >= 4.0 at 80 Hours, AATCC Test Method 16.
13. Primary Backing Material: PVC-Free.

2.04 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Resilient Base: See Section 09 65 00 - Resilient Flooring.

C. Edge Strips: Rubber, color as selected by Architect.
   1. CON-WOM #169 Reducer manufactured by Roppe; or approved equivalent product.

D. Adhesives:
   1. Compatible with materials being adhered; maximum VOC content as specified in Section 01 61 16.

E. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.
   1. Water-resistant, non-staining and nonflammable type as recommended by carpet manufacturer to be compatible with backing materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
   1. Maximum variation of 1/8-inch in 10 ft

B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
   1. Test in accordance with Section 09 05 61.
   2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3. Follow moisture and alkalinity remediation procedures in Section 09 05 61.

D. Carpet Verification: Verify carpet match before cutting or placement to ensure minimal variation between dye lots.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install carpet tile in accordance with manufacturer's instructions and CRI 104 (Commercial).

C. Blend carpet from different cartons to ensure minimal variation in color match.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

1. Locate change of color or pattern between rooms under door centerline.

F. Locate change of color or pattern between rooms under door centerline.

G. Fully adhere carpet tile to substrate.

H. Trim carpet tile neatly at walls and around interruptions.

1. Edges: Run carpet under open bottom items and all cabinets and install tight to walls. Neatly trim and secure edge of carpet adjacent to door jambs where no base occurs.

I. Complete installation of edge strips, concealing exposed edges.

J. Carpet Finishing: Brush all seams and trim protruding pile tufts level. Remove excess adhesive on the carpet surface and thoroughly vacuum entire area. Leave room clean and ready for use.

3.04 PROTECTION

A. Cover carpet during construction period with reinforced kraft paper when construction traffic is required to cross carpeted areas.

B. Remove and replace damaged or improperly installed carpet.

3.05 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

1. Vacuum and remove all stains from carpet to satisfaction of District and in accordance with cleaning specified in Section 01 70 00 - Execution and Closeout Requirements.

END OF SECTION

SECTION 12 24 00
WINDOW ROLLER SHADES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Roller shades, manual operation and accessories.

B. Shade fabric.

1.02 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.

B. Section 09 21 16 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.

1.03 REFERENCE STANDARDS

A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. Cradle to Cradle Products Innovation Institute (C2C):

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: One week prior to commencing work related to this section. Require attendance of all affected installers.

B. Sequencing:

C. Do not fabricate shades until field dimensions for each opening have been taken with finished conditions in place. "Hold to" dimensions are not acceptable.

D. Do not install shades until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Bid Submittal: Information Required with Submittal of Bid: In order to evaluate proposals for integrated lighting control and window shade systems, the Architect requires the following information be submitted prior to the award of the system.

1. Bid proposal shall be accompanied with a document that notes all deviations from these specifications on a line-by-line basis.

C. Product Data: Manufacturer's catalog pages and data sheets for products specified including materials, finishes, dimensions, profiles, mountings, and accessories.

1. Preparation instructions and recommendations.
2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes , accessories, and operating instructions.
3. Storage and handling requirements and recommendations.
4. Mounting details and installation methods.

5. Manufacturer's Instructions: Include storage, handling, protection, examination, preparation, and installation.
6. Project Record Documents: Record actual locations of control system components and show interconnecting wiring.

D. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.
1. Prepare shop drawings on AutoCad or MicroStation format using base sheets ovided electronically by the Architect.
2. Provide location plan showing all manual shade control locations. Cross-reference furniture plans for optimal positioning of chains.
3. Provide elevation drawings showing shade band layout. Indicate any necessary seam or batten locations, and align with horizontal mullions where possible.

E. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements.
1. Shadecloth Sample: Mark face of material to indicate interior faces.
a. Test reports indicating compliance with specified fabric properties.
b. Verification Samples: 6 inches (150 mm) square, representing actual materials, color and pattern.

G. Warranty: Provide manufacturer’s warranty documents as specified in this Section.

1.06 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

B. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section.

C. Installer for Roller Shade System - Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.
1. Requirements for Roller Shade Installer/Contractor:
a. Roller Shade Hardware, shade fabric and all related controls shall be furnished and installed as a complete assembly.

D. Product Listing Organization Qualifications: Organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

E. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

F. ShadeCloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC9644 and ATCC9645, and E2180.

G. ShadeCloth Cleanability and Disinfecting: ShadeCloth must meet cleanability and disinfecting requirements via 3rd party testing to comply with BIFMA HCF 8.1-2014 standards using chemical solutions compliant with EPA guidelines for use against COVID-19.

1.07 MOCK-UP

A. Provide a mock-up of one roller shade assembly for evaluation of mounting, appearance and accessories.
   1. Locate mock-up in window designated by Architect.
   2. Mockup Size: Full size.
   3. Mockup Size (WxH): 3 x 3 feet (0.94 x 0.94 m) minimum.
   4. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
   5. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
   6. Do not proceed with remaining work until, mock-up is accepted by Architect.
   7. Retain mock-up during construction as a standard for comparison with completed work.
   8. Do not alter or remove mock-up until work is completed or removal is authorized.
   9. Full-sized mock-up may become part of the final installation.
   10. Full-sized mock-up will become the property of the Owner to be used for spare parts.

1.08 1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in Window Treatment Schedule.

B. Store and handle products per manufacturer's recommendations.

1.09 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.10 WARRANTY

A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating, transferrable warranty for interior shading.
   1. 1. Shade Hardware:
      a. Mecho/5 and Mecho/5x with ThermoVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25-years.
      b. Mecho/7 including bead chain with ThermoVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25-years.
   2. Standard Shadecloth: Manufacturer's standard 25-year warranty.
   3. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas, which are deemed owners responsibility.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer for Window Shade Control System as basis of design, performance and warranty: MechoShade Systems, Inc.; as represented by ARCHITYPE, Tel: (213) 631-5001. Fax: (213) 884-4790, Contact: Jean-Guy Poitras. Email: jean-guy.poitras@mechoshade.com ; jeanguy@architype.net.

B. Acceptable Manufacurer:

1. SWFContract; Precision+: www.swfcontract.com.

C. Requests for substitutions will be considered in accordance with provisions of Section 016000.

2.02 APPLICATIONS/SCOPE

A. Roller Shade Schedule:

1. Shade Type 1: Manual operating, chain drive, sunscreen single roller shades and related mounting systems and accessories as indicated on drawings.
   a. Shades at Classrooms: Mecho/7 multibanded wherever possible with chain located in front of classroom.
   b. Shades at other individual windows: Mecho/5.
   c. Basis of Design Fabric: SoHo 1600 Series 3%.
      1) Provide 1100 Series 1% in lieu of 3% as required.
2. ADA Compliance: All spaces requiring full ADA compliance to be motorized with an accessible wall switch.
3. CPSC Compliance: All manually operated window coverings with accessible cords, chains, continuous loop cords, etc. shall meet all current Federally mandated CPSC (Consumer Products Safety Commission) safety standards at time of manufacturing. Depending on the product type, additional hardware components may be required and added to meet new regulatory compliant anti-ligature requirements.
4. WCMA Compliance: Chain tensioning device complying with ANSI/WCMA A100.1-2022 manufacuted on every manual roller shade.

2.03 ROLLER SHADES, MANUAL OPERATION AND ACCESSORIES

A. Shade System; General:

1. Components capable of being removed or adjusted without removing mounted shade brackets, or cassette support channel.
2. Smoothly operation raising or lowering shades.
3. Cradle-to-Cradle certified and listed in C2C (DIR).
4. Environmental Product Declaration (EPD): Published disclosure of product's environmental impacts based on a full Life Cycle Assessment (LCA). Manufacturer must have EPD certification by independent 3rd party evaluation service.

B. Basis of Design: Mecho/7 System as manufactured by Mecho.

1. Description: Manually operated fabric window shades.
   a. Shade Type: Single Roller.
   b. Universal drive capability to offset drive chain for reverse or regular roll shades.
   c. Drop Position: Regular roll.

d. Mounting: As indicated on drawings.

e. Size: As indicated on drawings.

f. Fabric: As indicated under Shade Fabric article.

2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.

a. Material: Steel, 1/8 inch (3 mm) thick. Styrene based plastics, and /or polyester, or reinforced polyester shall not be accepted.

b. Single Shade Operation Width: Up to 180 inches (4572 mm) dependent on fabric.

c. Multiple Shade Band Operation: Provide hardware as necessary to operate a maximum of six shade bands, totaling up to 50lbs hanging weight or 360 inches (9144 mm) wide; depending on fabric weight whichever is greater, using a single clutch operator.

3. Roller Tubes:

a. Material: Extruded aluminum.

b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.

c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.

d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.

4. Hembars: Designed to maintain bottom of shade straight and flat.

a. Style: Full wrap fabric-covered bottom bar, flat profile with heat sealed closed ends.

5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.

a. Heavy-duty, 1/8” steel mounting bracket and integrated steel brake, clutch and sprocket assembly rigidly affix the shade support and user control to the building structure fully independent of the roller tube components.

b. Permanently lubricated maintenance-free brake assembly employs an oil-impregnated steel hub with wrapped spring clutch.

c. Brake must withstand minimum pull force of 50 pounds (22.7 kg) in the stopped position.

d. Direct drive clutch requires no interstitial gear stages or plastic parts between the building structure and clutch ensuring reliable operation across the full range of shade sizes.

e. Urethane dampened clutch protects bead chain and clutch from failure due to high shock loads during shade operation minimizing down time.

f. Maximum shade hanging weight of 50 pounds (22.7 kg).

g. Clutch shall be upgradable to motorized drive on compatible tubes without requiring change in mounting attachment method/location, roller tube or fabric band.

h. Motorized drive options available require no additional wiring to be added for power or communication capability for switch or automated operation.

6. Drive Chain: Continuous loop T304 stainless steel beaded ball chain, 100 pound (45 kg) minimum breaking strength warranted from breaking for the life of the shade system hardware under prescribed operation. Provide upper and lower limit stops.
    a. Chain Tensioner: Chain tensioning device complying with ANSI/WCMA A100.1-2022.
    b. Limit stops: Bead stops affixed to the chain maintain consistent shadeband alignment at the top and bottom of shade travel across multiple shades, and help prevent shade damage resulting from unmanaged user control.
7. Mecho/7, Managed Lift Force, Hardware: Lifts single band or multiband shade assemblies:
    a. Lifting Force: 3 to 8.5 pounds (1.4 to 3.9 kg) max pull force to lift shade assemblies with a shade band hanging weight, not including mounting hardware, of up to 50 pounds (22.7 kg).
    b. Direct drive clutch with Managed Lift Force provides the best user experience by managing the user pull force while using the fewest number of chain pulls to position a shade.
    c. Backward compatible to Mecho/5 components including fascia, regular and reverse roll, pockets, and wall-mounting accessories.
    d. Includes offset drive capability, left/right, front, or back to allow for utilization of blackout channels.
    e. Allows for ease of operation when obstructions do not allow for direct drive chain access.
    f. Offset chain drive shall not cause an increase of friction or pull force when operated up to a 26 degree angle from vertical.
8. Accessories:
    a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners.
        1) Finish: To be selected from manufacturer’s standard colors.
        2) Endcaps as required.
    b. Can be installed across two or more shade bands in one piece.
    c. Single Fascia: Accommodate regular roll shades.
    d. Profile: Square.
    e. Configuration: Captured and continuous, as indicated on drawings.
    f. Adjustable Multi-band Coupler: Field-adjustable coupler positioned between adjacent shadebands driven by the same clutch facilitates hembar alignment between the bands while maintaining the light gap between the shade bands to no more than 1.25 inch (32mm).

C. Basis of Design: Mecho/5 System as manufactured by Mecho.
1. Description: Manually operated fabric window shades.
    a. a. Shade Type: Single Roller.
    b. Universal drive capability to offset drive chain for reverse or regular roll shades.
    c. Drop Position: Regular roll.
    d. Mounting: As indicated on drawings.

e. Size: As indicated on drawings.

f. Fabric: As indicated under Shade Fabric article.

2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.

   a. Material: Steel, 1/8 inch (3 mm) thick.

3. Roller Tubes:

   a. Material: Extruded aluminum.

   b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.

   c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.

   d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.

4. Hembars: Designed to maintain bottom of shade straight and flat.

   a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.

5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.

   a. Heavy-duty, 1/8” steel mounting bracket and integrated steel brake, clutch and sprocket assembly rigidly affix the shade support and user control to the building structure fully independent of the roller tube components.

   b. Permanently lubricated maintenance-free brake assembly employs an oil-impregnated steel hub with wrapped spring clutch.

   c. Brake must withstand minimum pull force of 50 pounds (22.7 kg) in the stopped position.

   d. Direct drive clutch requires no interstitial gear stages or plastic parts between the building structure and clutch ensuring reliable operation across the full range of shade sizes.

   e. Maximum shade hanging weight of 18 pounds (8.2 kg).

6. Drive Chain: Continuous loop stainless steel beaded ball chain, 100 pound (45 kg) minimum breaking strength. Provide upper and lower limit stops.

   a. Chain Tensioner: Chain tensioning device complying with ANSI/WCMA A100.1-2022.

   b. Limit stops: Bead stops affixed to the chain maintain consistent shadeband alignment at the top and bottom of shade travel across multiple shades, and help prevent shade damage resulting from unmanaged user control.

7. Accessories:

   a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners.

      1) Finish: To be selected from manufacturer’s standard colors.

      2) Endcaps as required.

      3) Can be installed across two or more shade bands in one piece.

      4) Single Fascia: Accommodate regular roll shades.

5) Profile: Square.

6) Configuration: Captured and continuous, as indicated on drawings.

2.04 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.

1. Vertical Dimensions: Fill Opening from Head to Sill: 1/2 inch (13 mm) space between bottom bar and window sill.

2. Horizontal Dimensions: Inside Mounting.

a. Symmetrical Light Gaps on Both Sides of Shade: 3/4 inch (19.05 mm) total.

3. Horizontal Dimensions: Outside mounting.

a. Cover window frames, trim, and casings completely.

C. Openings Requiring Continuous Multiple Shade Units with Separate Rollers: Locate roller joints at window mullion centers; butt rollers end-to-end.

2.05 SHADE FABRIC

A. Basis of Design: Shade fabric as manufactured by MechoShade Systems LLC.

1. Solar Shadecloths:

a. Fabric: Soho: 1100 series. 1 percent open. 2 x 2 basket-weave pattern of fine yarn PVC and polyester blend, also 126 inches (3200 mm) wide.

1) NRC Rating: 0.60.

2) SAA Rating: 0.64.

3) Low-Emitting Material Certification: Greenguard Gold certified and listed in UL (GGG).

4) Health Product Declaration (HPD): Published declaration with full disclosure of known hazards.

5) Environmental Product Declaration (EPD): Published disclosure of product's environmental impacts based on a full Life Cycle Assessment (LCA). Manufacturer must have EPD certification by independent 3rd party evaluation service.

b. Fabric: Soho: 1600 series. 3 percent open. 2 x 2 basket-weave pattern of fine yarn PVC and polyester blend, also 126 inches (3200 mm) wide.

1) NRC Rating: 0.25.

2) SAA Rating: 0.29.

3) Low-Emitting Material Certification: Greenguard Gold certified and listed in UL (GGG).

4) Health Product Declaration (HPD): Published declaration with full disclosure of known hazards.

5) Environmental Product Declaration (EPD): Published disclosure of product's environmental impacts based on a full Life Cycle Assessment (LCA). Manufacturer must have EPD certification by independent 3rd party evaluation service.

c. Color: Selected from manufacturer's standard colors.

2. Performance Requirements:
    a. Flammability per NFPA 701: Pass. Large or small scale test.
    b. Fungal Resistance: No growth when tested per ASTM G21.
    c. Cleanability and Disinfecting: ShadeCloth must meet cleanability and disinfecting requirements via 3rd party testing to comply with BIFMA HCF 8.1-2014 standards using chemical solutions compliant with EPA guidelines for use against COVID-19.

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.

C. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

C. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

A. Contractor Furnish and Install Responsibilities:

1. Window Covering Contractor (WC) shall provide an on site, Project Manager, and shall be present for all related jobsite scheduling meetings.
2. WC shall supervise the roller shade installation, and setting of intermediate stops of all shades.
3. WC shall be responsible for field inspection on an area-by- area and floor-by-floor basis during construction to confirm proper mounting conditions per approved shop drawings.
4. Verification of Conditions: examine the areas to receive the work and the conditions under which the work would be performed and notify General Contractor and Owner of conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of installation shall constitute acceptance of substrate conditions by the installer.
5. WC shall provide accurate to 0.0625” inch (1.5875mm); field measurements for custom shade fabrication on the Roller Shades manufacturers input forms.
6. WC Installer shall install roller shades level, plumb, square, and true according to manufacturer’s written instructions, and as specified here in. Blocking for roller shades installed under the contract of the interior General Contractor shall be installed plumb, level, and fitted to window mullion as per interior architect’s design documents and in accordance with industry standard tolerances. The horizontal surface of the shade pocket shall not be out-of-level more than 0.625” (15.875mm) over 20 linear feet (6.096 meters)
7. Shades shall be located so the shade band is not closer than 2 inches (50 mm) to the interior face of the glass. Allow proper clearances for window operation hardware.

8. Adjust, align and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
9. Installer shall set Upper and Lower limits of all manual shade bands, and assure alignment in accordance with the above requirements.
10. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
11. WC shall train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.
    a. Use operation and maintenance manual as a reference, supplemented with additional training materials as required.

3.04 PROTECTION AND CLEANING

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.
1. Clean soiled shades and exposed components as recommended by manufacturer.
2. Replace shades that cannot be cleaned to "like new" condition.

END OF SECTION

SECTION 26 09 23
LIGHTING CONTROL SYSTEMS AND DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Digital lighting management systems.
2. Programmable electronic astronomic time switches.
3. Daylight-harvesting controls and photoelectric sensors.
4. Indoor occupancy and vacancy sensors.
5. Switchbox-mounted occupancy sensors.
6. Standalone dimmers for LED lighting (0-10V)
7. Lighting contactors.
8. Lighting control relay panels.
9. Emergency lighting shunt relay (UL-924).
10. Conductors and cables.

1.2 SUBMITTALS

A. Product Data and Shop Drawings:

1. Submit manufacturer's technical product data for each type of lighting control system and its components.
2. Manufacturer's warranty documentation specifically for this contract.
3. Floor plans and reflected ceiling plans showing occupancy and daylight-harvesting photoelectric sensor locations.
4. Include typical mounting details for each sensor type.
5. Detailed point to point wiring diagrams.
6. Wiring schedules.
7. Typical wiring diagrams for each component.
8. System diagrams showing contactor panels, number and type of switches and sensors, low-voltage switches, and building energy management system computer.
9. Provide sequence of operations for each space type in a format suitable for programming requirements of the specific system and meeting the intent of the sequence of operation provided by the architect/engineer.
10. Room schedule showing devices listed by room, their serial numbers, and the loads they control.

B. Closeout Documentation:

1. Field quality-control test reports.
2. Record drawings reflecting as-built information, including floor plans, wiring diagrams, equipment and wiring schedules, and room schedules.

3. Operation and Maintenance Manuals:

    a. Manufacturer's technical product data and maintenance data.
    b. Manufacturer's warranty documentation.

4. Software and Firmware Operational Documentation:

    a. Software service agreement.
    b. Software operating and upgrade manuals.
    c. Device address list.
    d. Printout of software application and graphic screens.
    e. Program Software Backup: On a USB Thumb drive or compact disc, complete with data files.

1.3 WARRANTY

A. Manufacturer and Installer warrant that installed lighting control devices perform in accordance with specified requirements and agree to repair or replace, including labor, materials, and equipment, software, and devices that fail to perform as specified within extended warranty period.

1. Special Extended Warranty Period: Shall exceed four (4) years starting from the date of Substantial Completion.

    a. If the manufacturer’s warranty commences upon the date materials are delivered, then the manufacturer’s warranty period shall be at least five (5) years to meet the requirement stated above.

1.4 SOFTWARE AND FIRMWARE SERVICE AGREEMENT

A. Technical Support: Beginning at Substantial Completion provide a 5-year software service agreement to the Owner.

B. Software and Firmware Upgrades:

1. At Substantial Completion, update software and firmware to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Verify upgrading software includes operating system and new or revised licenses for using software.
2. Upgrade Notice: Provide a 30-day notice to Owner to allow scheduling and access to the system and to allow Owner upgrade to computer equipment if necessary.
3. Upgrade Reports: Prepare written report after each update, documenting upgrades installed.

1.5 QUALITY ASSURANCE

A. Codes and Standards:

1. NFPA 70, National Electrical Code (NEC).
2. UL 508, Standard for Industrial Control Panels.
3. UL 916, Standard for Energy Management Equipment.
4. UL 917, Standard for Clock Operated Switches.
5. UL 924, Standard for Emergency Lighting and Power Equipment.
6. 47 CFR, Subparts A and B, for Class A digital devices.

B. Comply with NEC, NEMA, and FCC emission requirements for Class A applications. Comply with applicable city, county, and state codes and ordinances.

C. Certification: Manufacturer shall certify that products will meet product specifications and local energy codes. If any additional equipment is required to meet coverage patterns and local energy codes, provide additional equipment at no additional cost to the Owner.

D. Selection, quantity, and placement of all lighting control sensors as indicated on the drawings shall be regarded as the basis of design. Under this contract, engage a factory-authorized representative to determine optimal selection, quantity, and placement of sensors and other system components using the manufacturer's actual devices, and to guarantee the proper application and correct operation of such devices. Any deviation from the basis of design still must comply with these specifications and must result in function and performance that meets or exceeds that of the basis of design.

E. Manufacturer's Field Service and Commissioning: Engage a factory-authorized service representative to inspect, test, and adjust sensors and associated system components, and to guarantee sensor performance.

F. Ceiling-mount devices and wall-mount devices installed above 6 ft. shall be flat and/or textured white. Wall-mount devices installed 42-inch above floor shall match device color and wall plate specified in Section 262726 "Wiring Devices".

PART 2 - PRODUCTS

2.1 DIGITAL LIGHTING MANAGEMENT SYSTEMS

A. Source Limitations: Obtain lighting control module and power distribution components through one source from a single manufacturer

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acuity Brands, Inc. (nLight / Sensor Switch).
2. Crestron Electronics, Inc. (Green Light).
3. Eaton / Greengate / Cooper Lighting Controls, Inc.
4. Encelium / Osram Sylvania, Inc.
5. Hubbell Building Automation / Lighting Controls (NX Distributed Intelligence).
6. Intelligent Lighting Controls, Inc.
7. Leviton Manufacturing Co.
8. Touche Controls / ESI Ventures.

9. Watt Stopper/Legrand Vantage Controls/Digital Lighting Management.
10. Linx/Lutron
11. NX

C. System Architecture: System shall have an architecture that is based upon three main concepts; 1) intelligent lighting control devices, 2) standalone lighting control zones, and 3) network backbone for remote or time-based operation utilizing lighting control relay panels.

D. System Architecture as it applies to School District standards:

1. Lighting in classrooms, offices, conference rooms, multi-purpose rooms, and rooms of similar size and function: Utilize intelligent room controllers in conjunction with intelligent sensors and switches to meet design intent and code required lighting control for the space. These spaces shall be stand-alone and not networked at this time. An auxiliary contact to trigger occupied/unoccupied modes for mechanical system shall be provided either integral to the occupancy sensor or as an additional unit connected to the system. Unless noted otherwise, all 0-10V wiring to dimmable fixtures shall be connected between fixtures and intelligent room controllers.
2. Lighting in central spaces and large spaces such as corridors, gymnasiums, and lunchrooms: Utilize intelligent lighting relay panels, with 0-10V dimming outputs in conjunction with intelligent sensors and switches to meet design intent and code required lighting control for the space. Unless noted otherwise, all 0-10V wiring to dimmable fixtures shall be connected between interior lighting fixtures and relay panel. All relay panels shall be networked together and connected to the BAS via BACNET interface. System shall receive timing commands from the BAS system.
3. Exterior Lighting: Utilize intelligent lighting relay panels to meet design intent and code required lighting control. Dimming outputs and 0-10V wiring are not required for exterior lighting unless noted on the drawings. All relay panels shall be networked together and connected to the BAS via BACNET interface. System shall receive timing commands from the BAS system via photoelectric sensor connected through the BAS system and provided by the BAS contractor.
4. Small, regularly unoccupied spaces such as storage rooms: Stand-alone wall box sensors may be used.
5. Plug loads: Utilized intelligent load rated relay panels to control switched receptacles throughout the building. Plug load relay panels shall be separate from lighting relay panels. All relay panels shall be networked together with lighting relay panels to receive timing signals from the BAS and to make any required programming adjustments. A central override switch shall be located per the drawings or per district direction (typically either the main electrical room or main mechanical room) to override receptacles on or off.

E. System Description and Operation

1. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photoelectric sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these components into a single device enclosure should be permissible to minimize overall device count of system.

2. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher-level network backbone.
3. Lighting control zone shall be capable of automatically configuring itself for default operation without any startup labor required.
4. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.
5. Power for devices within a lighting control zone shall come from either resident devices already present for switching (relay device) or dimming purposes, or from the network backbone. Standalone “bus power supplies” shall not be required in all cases.
6. All switching and dimming for a specific lighting zone shall take place within the devices located in the zone itself (i.e., not in a remotely located devices such as panels) to facilitate system robustness and minimize wiring requirements. Specific applications that require centralized or remote switching shall be capable of being accommodated.
7. System shall have a primary wall mounted network control “gateway” device capable of accessing and controlling connected system devices and linking into an Ethernet LAN.
8. System shall use “bridge” devices that route communication and distribute power for up to 8 lighting zones together for purposes of decreasing system wiring requirements.
9. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control profiles.
10. Individual lighting zones shall be capable of being segmented into several channels of occupancy, photoelectric sensor, and switch functionality for more advanced configurations and sequences of operation.
11. System shall be capable of operating a lighting control zone according to several sequences of operation. Note operating modes should be utilized only in manners consistent with local energy codes.

    a. Auto-on / auto-off (via occupancy sensors)
    b. Manual-on / auto-off
    c. Auto-to-override on
    d. Manual-to-override on
    e. Auto on /predictive off
    f. Multi-level on (multiple lighting levels per manual button press)

12. Control software shall enable logging of system performance data and presenting useful information in a web-based graphical format and downloadable to .CSV files.
13. System programming shall be done in the following fashion:

    a. For completely networked systems, system programming and control adjustments can be done via software from a single point in the network.
    b. For stand-alone systems, programming shall be done by hand-held remote control or by software app via standard wireless protocol such as Wi-Fi or Bluetooth.

14. Control software shall enable integration with a BAS via BACNET IP.

F. System Cabling: Intelligent devices shall be connected to the LRC (lighting room controller). Communications and Class 2 low voltage power shall be provided to each intelligent device via standard low-voltage UTP Category 5 cabling with RJ45 connectors. RJ45 adapters may be used to allow standard analog sensors to be used.

1. All cabling for intra-room connectivity of control devices (example, between power packs and from power packs to sensors and switches) shall be pre-manufactured and provided by controls manufacturer.
2. Intelligent lighting control devices shall communicate digitally and possesses at least two RJ45 connectors.
3. Devices within a lighting control zone shall be connected using low-voltage cabling, in a daisy-chain fashion, and in any order.
4. System shall provide the option of having pre-terminated plenum rated Category 5 cabling supplied with hardware.

G. Management Software

1. Every device parameter (e.g., sensor time delay and photoelectric sensor set-point) shall be available and configurable remotely from the software.
2. The following status monitoring information shall be made available from the software for all devices for which it is applicable: current occupancy status, current occupancy sensor status, remaining occupancy time delay(s), current photoelectric sensor reading, current photoelectric sensor inhibiting state, photoelectric sensor transitions time remaining, current dim level, device temperature, and device relay state(s).
3. The following device identification information shall be made available from the software: model number, model description, serial number, manufacturing date code, custom labels, and parent network device.
4. A printable network inventory report shall be available via the software.
5. A printable report detailing all system profiles shall be available via the software.
6. Software shall require all users to login with a username and password.
7. Software shall provide at least three permission levels for users.
8. All sensitive stored information and privileged communication by the software shall be encrypted.
9. All device firmware and system software updates must be available for automatic download and installation via the internet.
10. Software shall be capable of managing systems interconnected via a WAN (wide area network).

H. Applications:

1. Furnish and install digital lighting management systems in each room, space, or area as indicated on the Drawings, or wherever the following applies:

    a. Wherever lighting is controlled by a low-voltage multi-button control station (as opposed to a line-voltage switch).
    b. Wherever the Energy Code requires the lighting to be turned on via manual operation only and/or a room where the lighting is controlled by one or more vacancy sensors.

2. Specific locations, in which digital lighting management systems are required and are not required, are as follows:

    a. Required:

        1) Classrooms.
        2) Offices and open office spaces.
        3) Rooms in which 0-10V dimming is indicated.
        4) Other rooms as noted on the plans.

    b. Not required:

        1) Corridors.
        2) Restrooms.
        3) Lobbies / circulation spaces.
        4) Utility rooms.
        ~~5) Small offices.~~

I. Intelligent Lighting Room Controller (LRC)

1. The LRC associated with each Digital Lighting Management System is not necessarily shown on the plans.

    a. Each controller shall be mounted above the accessible ceiling, unless otherwise noted. Where there are no suspended ceilings, mount controller above nearest accessible ceiling or near the associated power panelboard. The contractor shall be responsible for determining the optimum locations in the field.
    b. Controllers mounted above accessible ceilings shall be furnished with a plenum-rated enclosure. If ceiling is not accessible, provide an access panel in the ceiling or coordinate with the Owner an acceptable location for a surface-mounted enclosure.

2. System shall be true digital control with digital sensors and other components. Hybrid analog systems are not acceptable.
3. The installation of software shall not be required. At a minimum, the user interface shall provide the following functions:

    a. Automatic discovery of system devices.
    b. Commissioning of devices into logical control zones and areas.
    c. Display the entire system in a logical navigation tree view
    d. Allow the user to name zones, groups, presets, schedules, and individual loads.
    e. Setup control functions for system inputs and outputs.
    f. Monitor status and override individual relays and dimmers.
    g. Plug-load control, where applicable. Refer to drawings.
    h. Setup and download schedules to panels and room controllers.
4. Network Capabilities:

    a. LRC shall have the ability to communicate by means of TCP/IP over Ethernet allowing enterprise connectivity between the Lighting Control System and external LAN or WAN networks.

b. Provide integral capability to communicate with the Building Automation System via BACnet IP protocol.
c. The LRC shall function as a web server allowing the user interface to be accessible through a standard web browser.
d. Once programming is complete, any time-clock functionality in the LRC shall be disabled to prevent conflicts with scheduling signals from the BAS system via Bacnet.

5. Programming shall be stored in non-volatile memory, so that all field-settings and programming are retained in the event of a power outage.
6. Unit power supply shall be dual-rated or rated to match its branch lighting circuit connection of 120-volt or 277-volt AC as indicated on the plans.
7. Each LRC that is required in a space shall be capable of accommodating and controlling at least two (2) line-voltage lighting circuits. Provide additional units as required for application indicated on the Lighting Plans and/or Schedules.
8. Each LRC must be capable of accommodating and controlling at least one 120-volt AC 20-amp plug-load circuit.
9. Unit must be capable of providing 0-10 VDC 200 mA dimming controls for each zone (or "switchleg") of LED dimmable drivers. Dimmer interface shall be achieved via lighting control stations with programmable pushbuttons. Applications, zones, and quantities shall be determined per the drawings.
10. Unit must interface with presence sensors that are designated as vacancy sensors to enable lights to be turned on only manually—not automatically unless the lights had timed-out within the previous 30 seconds.
11. Integral surge protection: Meets ANSI/IEEE Standard C62.41-1980, tested to withstand momentary voltage surges up to 6000V and current surges up to 200A without damage.
12. Furnish and install a completely functioning turnkey system. Include all necessary accessories, programming, settings, commissioning, and testing.
13. Communications and Class 2 low-voltage power connection between LRC and input devices (control stations, sensors, etc.) shall be standard low-voltage UTP Category 5 cabling with RJ45 connectors.

J. Low-Voltage Momentary-Contact Programmable Pushbutton Lighting Control Stations

1. Provide programmable 1-, 2-, 3-, 4-, 5-, 6-. 7-, or 8-button control stations corresponding to each application indicated on the lighting plans and lighting control diagrams, including power enable/disable and dimming controls. "Buttons" may also be provided via an optional touchscreen interface device.
2. Include an LED status indictor integral to each programmable button or a touchscreen status indicator.
3. Include factory-produced symbols etched into each programmable button to indicate its general function, such as on/off, up, down (dimming), etc. Refer to details on the drawings. If an optional touchscreen interface device is provided, labeling and symbols may be programmed on the display.
4. Multiple control stations located within in the same vicinity shall be mounted in a common wall-box with a multi-gang faceplate.
5. Initial Programming: Upon energizing luminaires, each control station shall be programmed to provide basic manual on/off functions (so that no luminaire remains on or off 24/7 without manual control). This initial programming shall be provided prior to the

manufacturer's factory-authorized technician performing their official system programming, configuration, startup, and system commissioning services.

6. Communications and Class 2 low-voltage power connection between device and LRC shall be standard low-voltage UTP Category 5 cabling with RJ45 connectors.

K. Presence Sensors (Indoor Occupancy and Vacancy Sensors)

1. Refer to indoor occupancy/vacancy sensors below for types and performance specifications.

    a. Auxiliary Contacts: Provide each zone of lighting control with an additional auxiliary contact/relay, form C, dry contacts, rated for and compatible with the building automation system (BAS). Contact may be provided integral to either the presence sensor or the LRC. Coordinate with the Division 23 contractor.

2. Presence sensors shall function as vacancy sensors by default, which requires the occupant to manually turn-on the lights.

    a. Typical exceptions, unless noted otherwise: Toilet rooms, restrooms, locker rooms, and other special locations as indicated on the drawings.

3. Communications and Class 2 low-voltage power connection between device and LRC shall be standard low-voltage UTP Category 5 cabling with RJ45 connectors.

L. Photoelectric Sensors (Digital Daylight-Harvesting Dimming Controls)

1. Refer to Daylight-Harvesting Dimming Controls (Digital) below for types and performance specifications.
2. Device shall be provided in conjunction with a dimming daylighting system capable of being programmed and calibrated to maintain the lighting design level in the room served.
3. The daylight sensor shall provide ambient light level information to the LRC allowing daylight responsive lighting control.
4. Communications and Class 2 low-voltage power connection between device and LRC shall be standard low-voltage UTP Category 5 cabling with RJ45 connectors.

M. Intelligent lighting control relay panels to be integrated with digital management lighting systems.

1. Refer to Lighting Control Relay Panels below for additional specifications.
2. Panel shall supply current limited low voltage power to other networked devices connected via Category 5 cabling.
3. Dimming channels shall be assignable to control zones as required via the control software.
4. Dimming channels shall be configurable to respond to manual raise/lower wall switch control stations, preset scenes, or daylight-harvesting photoelectric sensors.
5. Switched receptacles shall be controlled via relay panels. Each circuit shall have a dedicated relay to allow for programming flexibility and to limit the effect of a faulty relay or receptacle.

N. Network Communication Bridges

1. Device shall surface mount to a standard 4" x 4" square junction box.
2. Device shall have a minimum 4 RJ-45 ports.
3. Device shall be capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to Control Gateway or central head end.
4. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply or delivered via a low voltage cabled connection.
5. Device shall be careful of redistributing power from its local supply and connect lighting control zones with excess power to lighting control zones with insufficient local power.

2.2 PROGRAMMABLE ELECTRONIC ASTRONOMIC TIME CONTROLLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grasslin Controls Corporation; a GE Industrial Systems Company.
2. Intermatic, Inc.
3. Leviton Mfg. Company, Inc.
4. Lightolier Controls; a Genlyte Company.
5. Lithonia Lighting; Acuity Lighting Group, Inc.
6. Paragon Electric Co.; Invensys Climate Controls.
7. Square D; Schneider Electric.
8. TORK.

B. Electronic, solid state, programmable, with alphanumeric display; astronomic time feature, complying with UL 917.

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
2. Programming Capabilities: Each channel/contact shall be individually programmable with 40 on-off operations per week, plus 4 seasonal schedules that modify the basic program, and an annual holiday schedule that overrides the weekly operation on holidays.
3. Programmable Channels/Contacts: Refer to Drawings for quantities necessary to control zones of lighting that require time control. Provide one additional unused spare channel for future.
4. Astronomic Time: Provide for all channels to enable geographically specific time-of-day adjustments corresponding to dusk and dawn.
5. Contact Configuration: **DPDT**
6. Contact Rating: **20A 120/277 V(ac)**
7. Programs:

   a. Four (4) on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
   b. Two on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.

c. Four (4) channels; each channel is individually programmable with eight on-off set points on a 24-hour schedule.
d. Two (2) channels; each channel is individually programmable with two on-off set points on a 24-hour schedule with a skip-a-day weekly schedule.

8. Astronomic Time: **All** channels.
9. Automatic daylight savings time changeover.
10. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.
11. Unit Operating Voltage: 120 V(ac) or 277 V(ac), whichever voltage is most readily available. Refer to the drawings. Provide power connection to nearest available panel and branch circuit.

2.3 OUTDOOR PHOTOELECTRIC SWITCHES, SOLID STATE, FLEXIBLE MOUNTING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1. Grasslin Controls Corporation; a GE Industrial Systems Company.
2. Intermatic, Inc.
3. Leviton.
4. Novitas, Inc.
5. Paragon Electric Co.; Invensys Climate Controls.
6. Square D; Schneider Electric.
7. TORK.

B. Description: Solid state, with **SPST** dry contacts rated for **1800 VA inductive**, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A, and compatible with ballasts and LED lamps.

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range. As needed, provide **a directional lens in front of the photoelectric sensor to prevent fixed light sources from causing turn-off**.
3. Time Delay: Fifteen-second minimum, to prevent false operation.
4. Surge Protection: Metal-oxide varistor.
5. Mounting: Twist lock complies with ANSI C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
6. Failure Mode: Luminaire stays ON.

2.4 DAYLIGHT-HARVESTING DIMMING CONTROLS, DIGITAL

A. Manufacturers:

1. Watt Stopper / Legrand (Vantage Controls).
2. Acuity Brands, Inc. (nLight / Sensor Switch).
3. Crestron Electronics, Inc. (Green Light).

4. Eaton / Greengate / Cooper Lighting Controls, Inc.
5. Encelium / Osram Sylvania, Inc.
6. Hubbell Building Automation.
7. Intelligent Lighting Controls, Inc.
8. Leviton Manufacturing Co.
9. Linx/Lutron
10. NX

B. Description: Sensing daylight and electrical lighting levels, the system adjusts the indoor electrical lighting levels. As daylight increases, lights are dimmed.

1. The system shall operate in an open or closed loop sequence of operation reducing the amount of electric light as the quantity of daylight entering the room increases.
2. It shall be possible to configure multiple daylight zones in a room with open loop sensors. Each zone shall be programmable to proportionally respond to the light level provided by the daylight sensor.
3. Lighting control set point is based on the following two lighting conditions:

    a. When no daylight is present (target level).
    b. When significant daylight is present (exceeding target level).

4. System programming is done with two hand-held, remote-control tools.

    a. Initial setup tool.
    b. Tool for occupants to adjust the target levels by increasing the set point up to 25 percent, or by minimizing the electric lighting level.

5. Programming shall be stored in non-volatile memory, so that all field-settings and programming are retained in the event of a power outage.

C. Ceiling-Mounted Dimming Controls: Solid-state, light-level sensor unit, with **separate** power-pack, to detect changes in indoor lighting levels that are perceived by the eye.

1. If photoelectric sensor is associated with a digital lighting management system, in which case the LRC (lighting room controller) shall function as the power-pack.
2. Sensor shall be mounted and positioned to provide an unobstructed view of the windows per the manufacturer's directions.

D. Electrical Components, Devices, and Accessories:

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
2. Sensor Output: zero to 10 V(dc) to operate luminaires. Sensor is powered by controller unit.
3. Light-Level Sensor Set-Point Adjustment Range: 20 to 60 fc (120 to 640 lx).

E. Power Pack (if not integral to LRC): Digital controller capable of accepting three 8PSJ inputs with one output rated for 20 A LED load at 120 and 277 V(ac). Sensor has 24 V(dc) Class 2 power source.

2.5 INDOOR OCCUPANCY AND VACANCY SENSORS

A. Manufacturers:

1. Watt Stopper / Legrand.
2. Acuity Brands, Inc. (Sensor Switch).
3. Crestron Electronics, Inc.
4. Eaton / Greengate / Cooper Lighting Controls, Inc.
5. Encelium / Osram Sylvania, Inc.
6. Hubbell Building Automation.
7. Intelligent Lighting Controls, Inc.
8. Leviton Manufacturing Co.
9. Linx/Lutron
10. NX

B. General Requirements for all Presence Sensors:

1. Wall- or ceiling-mounted, solid-state indoor occupancy and vacancy sensors, as indicated on the drawings, designed to detect the presence of human activity within the desired space and to control the on/off function of the luminaires within that space.
2. Passive-infrared, ultrasonic or dual-technology as indicated on the drawings.
3. **Separate** power pack.

    a. If sensor is associated with a digital lighting management system, in which case the LRC (lighting room controller) shall function as the power pack.

4. **Hardwired** connection to switch or multi-button control station.
5. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
6. Sensors shall be able to function together with other sensors to provide expanded coverage areas by simply daisy-chaining together each device with low-voltage communications cabling.
7. Operation:

    a. Occupancy Sensor: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time-delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
    b. Vacancy Sensor: Unless otherwise indicated, lights are manually turned on and sensor turns lights off when the room is unoccupied; with a time-delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
    c. Combination Sensor: Unless otherwise indicated, sensor must be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; with a time-delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
    d. Programming shall be stored in non-volatile memory, so that all field-settings and programming are retained in the event of a power outage.

8. Power Pack (if not integral to LRC): Dry contacts rated for 20 A LED load at 120 and 277 V(ac), for 13 A tungsten at 120 V(ac), and for 1 hp at 120 V(ac). Sensor has 24 V(dc), 150 mA, Class 2 power source.
9. Mounting:

    a. Sensor: Suitable for mounting in any position in a standard device box or outlet box.
    b. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

10. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
11. Auxiliary Contacts: Provide each zone of lighting control with an additional auxiliary contact/relay, form C, dry contacts, rated for and compatible with the building automation system (BAS). Coordinate requirements with the Division 23 contractor.

C. PIR Type: Wall- or ceiling-mounted as indicated; detect occupants in coverage area by their heat and movement.

1. Detector Sensitivity: Detect occurrences of 6-inch (150 mm) minimum movement of any portion of a human body that presents a target of not less than 36 sq. inch (23 200 sq. mm).
2. Detection Coverage (Room, Ceiling Mounted): Detect occupancy anywhere in a 360-degree circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch high ceiling.
3. Detection Coverage (Corridor, Ceiling Mounted): Detect occupancy within 90 ft. (27.4 m) when mounted on a 10 ft. (3 m) high ceiling.
4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of **1000 sq. ft.** if positioned 84 inch (2100 mm) above finished floor, unless otherwise indicated on the drawings.

D. Ultrasonic Type: Wall- or ceiling-mounted as indicated; detect occupants in coverage area through pattern changes of reflected ultrasonic energy.

1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12-inch (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inch/s (305 mm/s).
2. Detection Coverage (Small Room): Detect occupancy anywhere within a 360-degree circular area of 600 sq. ft. (56 sq. m) when mounted on a 96-inch (2440 mm) high ceiling.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch (2440 mm) high ceiling.
4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. (186 sq. m) when mounted on a 96-inch (2440 mm) high ceiling.
5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 ft. (27.4 m) when mounted on a 10 ft. (3 m) high ceiling in a corridor not wider than 14 ft. (4.3 m).
6. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of **1000 sq. ft.** if positioned 84-inch (2100 mm) above finished floor.

E. Dual-Technology Type: Wall- or ceiling-mounted as indicated; detect occupants in coverage area using PIR/microphonics or PIR/ultrasonic detection methods. The type of detection technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch minimum movement of any portion of a human body that presents a target of not less than 36 sq. inch and detect a person of average size and weight moving not less than 12-inch in either a horizontal or a vertical manner at an approximate speed of 12 inch/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a 360-degree circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.
4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of **1000 sq. ft.** if positioned 84-inch above finished floor.

F. High-Ceiling Application PIR Type: Sensor suitable for mounting heights above 15-ft. and up to 45-ft.; ceiling-mounted; detect occupants in coverage area by their heat and movement.

1. Detector Sensitivity: Detect occurrences of 12-inch minimum movement of any portion of a human body that presents a target of not less than 144 sq. inch.
2. Detection Coverage: Detect occupancy anywhere in a 360-degreee circular area of 1500 sq. ft. when mounted on a 30-ft. high ceiling. Provide adequate coverage to enable sensors to be spaced 30-ft. apart in a square grid pattern, when mounted 30-ft. above the floor.

2.6 SWITCHBOX-MOUNTED OCCUPANCY AND VACANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Basis of Design: Watt Stopper / Legrand.
2. Acuity Brands, Inc. (Sensor Switch).
3. Crestron Electronics, Inc.
4. Eaton / Greengate / Cooper Lighting Controls, Inc.
5. Encelium / Osram Sylvania, Inc.
6. Hubbell Building Automation.
7. Intelligent Lighting Controls, Inc.
8. Leviton Manufacturing Co.

B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox**, using hardwired connection**.

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application, and must comply with California Title 24.
2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time-delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

3. Vacancy Sensor Operation: Same as occupancy sensor operation, except lights turn on only when occupant manually operates the switch.
4. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F (0 to 49 deg C).
5. Switch Rating: Not less than 15 A consisting of LED lighting load.

C. Features and Performance Characteristics:

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft.
2. Sensing Technology: PIR, unless indicated otherwise on drawings.
3. Switch Type: Single-pole, single switch-leg, unless indicated otherwise on drawings.
4. Field-selectable automatic "on" or manual "on".
5. Capable of controlling load in three-way application.
6. Voltage: Match the circuit voltage.
7. Concealed, field-adjustable, "off" time-delay selector at 30 seconds and 5, 10, and 20 minutes. Initial setting shall be 5 minutes.
8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

2.7 TIMER SWITCH, DIGITAL

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Intermatic
2. Leviton
3. Paragon
4. Tork

B. Description: Combination digital timer and conventional switch lighting control unit. Switchbox-mounted, backlit LCD display, with selectable time interval in 5-minute increments.

1. Rated 1000 W at 120 V(ac) and 277 V(ac) for LED lighting, and 1/4 hp at 120 V(ac).
2. Standards: Comply with UL 20.
3. Integral relay for connection to BAS.
4. Voltage: Match the circuit voltage.

2.8 LIGHTING CONTACTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allen-Bradley/Rockwell Automation.
2. Eaton Electrical Inc.; Cutler-Hammer Products.
3. GE Industrial Systems; Total Lighting Control.
4. Square D; Schneider Electric.
5. Siemens Energy and Automation, Inc.

B. Description: Multi-pole, electrically operated, and electrically held, unless indicated otherwise on the drawings, combination-type lighting contactors with non-fused hand-off-auto (HOA) switch, complying with NEMA ICS 2 and UL 508.

1. Multi-Pole Contactor: Provide the quantity of contacts indicated in the schedule shown on the drawings, which may include spares. Minimum quantity shall be two (2) contacts.
2. Current Rating for Switching: Listing or rating consistent with type of load served with 15 percent or less THD of normal load current). Minimum contact rating shall be 20 A 480 V(ac).
3. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
4. Enclosure: Comply with NEMA 250. Refer to drawings for specific applications.
5. Provide with HOA selector switch.

2.9 EMERGENCY LIGHTING SHUNT RELAYS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Entertainment Networks Corp.
2. Electronic Theater Controls, Inc. (ETC)
3. Bodine/Philips
4. Hubbell Building Automation, Inc.
5. Intelligent Lighting Controls, Inc.
6. LVS Controls, Inc.
7. Nine 24, Inc.
8. Watt Stopper
9. Or, where applicable, the same manufacturer as LRC associated with digital lighting management systems (listed above).

B. Description: NC, electrically-held relay in NEMA 1 enclosure, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924. Provide with test station integral to relay where ceiling-mounted or in a single-gang box where remote mounting is required.

1. Rated 1000 W at 120 V(ac) and 277 V(ac) for LED lighting.
2. Voltage: Match the circuit voltage.
3. Test Station: LED status indicators (normal/utility power, emergency, test), test button, white faceplate where mounted flush in the ceiling, unless indicated otherwise on the drawings.
4. LED Dimming Applications: Provide 0-10V dimming override feature that forces the control line to “full on” in the emergency bypass mode, unless indicated otherwise on the drawings.

C. Function: The UL-924 device shall control luminaires designated for emergency lighting during both normal and emergency modes by interfacing with associated normal switching means and by monitoring for loss of power to the normal lighting branch circuit. In the event of a power outage, luminaires connected to the emergency branch lighting circuit shall automatically be switched-on regardless of the status or position of associated normal lighting

control devices (switches, dimmers, sensors, LRCs, contactors, etc.). Under normal power, the UL-924 device shall mimic the normal switching means, as indicated on the drawings.

2.10 EQUIPMENT ENCLOSURES

A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.

1. Dry and Clean Indoor Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Food Preparation Areas (Kitchens): NEMA 250, Type 1, stainless steel.

2.11 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 DELEGATED DESIGN

A. This contract shall include the complete design and application of lighting control systems. Determine all system components, cabling specifications, and programming required for complete and functional operation. If necessary, obtain clarification from Architect/Engineer prior to bidding regarding intent of contract documents.

B. Provide additional quantities and placement of sensors as needed to achieve coverage of area served at actual mounting heights.

C. The wiring methods indicated on the electrical drawings are to indicate design intent only. Approved manufacturer controls products may have different driver and sensor requirements and different wiring methods than what is shown on the electrical drawings. Contractors are required to familiarize themselves with all required wiring, additional part and pieces, required installation labor, etc. to provide for a complete installed system that meets the intent and functionality of the specified system.

D. The Contractor shall provide as part of the shop drawing submittals, complete lighting drawings including all wiring, equipment, equipment locations, etc. for the submitted system.

E. All costs shall be included in the bid for a complete operational system that meets the specified and designed system.

F. Control Intent: Control Intent includes, but is not limited to the following:

1. Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.
2. Initial sensor and switching zones
3. Initial time switch settings

3.2 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

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

3.3 PRE-INSTALLTION COORDINATION

A. Pre-Submittal Meeting: Prior to submitting shop drawings, the General Contractor shall organize a coordination meeting to discuss the specifics of the lighting control design intent, sequence of operation, and specifics of the selected lighting control system to ensure that all appropriate parties are knowledgeable of the install and to make any last-minute adjustments to the system or sequence of operation. This meeting shall include the lighting designer, General contractor, Division 26 contractor, lighting control system manufacturer (or manufacturer's representative, and Owner's representatives.

B. Pre-installation Training: Lighting control system manufacturer or manufacturer representative shall provide up to one day of installation training to Division 26 contractor and the Owner's representatives prior to installation and rough-in of lighting control systems. This meeting shall be organized by the Division 26 contractor.

C. Classroom Mockup: Demonstrate system setup in room indicated prior to installations of other rooms for review by Owner's representatives.

3.4 INSTALLATION OF SENSORS

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies, as applicable.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's instructions.

3.5 INSTALLATION OF WIRING

A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.

B. Wiring within Enclosures: Separate power-limited and nonpower-limited conductors in accordance with conductor manufacturer's instructions.

C. Size conductors in accordance with lighting control device manufacturer's instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, device, and outlet boxes; terminal cabinets; and equipment enclosures.

E. Include a neutral conductor connected to every “switch point”, such as wall-switch occupancy sensors, in accordance with NEC 404.2(C).

F. Ceiling-Mounted Sensors: Provide a minimum 8-ft. slack loop of extra control cabling so the Owner can readily modify the placement of sensors in the future.

G. Open cabling methods may be utilized above accessible ceilings for Class 2 wiring. All cabling in exposed areas, above inaccessible ceilings, and inside walls shall be installed in raceway.

H. IDENTIFICATION

I. Identify components and power and control wiring in accordance with Section 260553 "Identification for Electrical Systems.

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

J. Label switches and contactors with a unique designation as specified or as indicated on the drawings.

3.6 PROGRAMMING AND DEVICE SETTINGS

A. Manufacturer’s Field Service and Commissioning: Engage a factory-authorized service representative to program, configure, test, and adjust components associated with each lighting control system and each lighting control device.

B. Initial Programming: Upon energizing luminaires associated with lighting control stations, each control station shall be programmed to provide basic manual on/off functions (so that no luminaire remains on or off 24/7 without manual control). This initial programming shall be provided prior to the manufacturer’s factory-authorized technician performing their official system programming, configuration, startup, and system commissioning services.

C. Occupancy and Vacancy Sensor Settings and Adjustments

1. Position, aim, and adjust sensors to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
2. Lights shall turn on immediately after the light-switch, dimmer, or control station is engaged.
3. Lights must stay on while presence is detected.
4. Lights shall turn off after a preset time-delay commencing from the last moment presence was detected (corresponding to vacancy). The initial time-delay off setting shall be 10 minutes. Coordinate final settings directly with the Owner.
5. Provide a walk-though with the Owner's representative to confirm final settings and overall functionality.
6. Occupancy and Vacancy Sensor Initial Time-Delay Settings

    a. Classrooms – 15 minutes.
    b. Public/Student Restroom – 15 minutes.
    c. Corridors – 10 minutes.
    d. Offices/conference Rooms – 15 minutes.
    e. Gymnasiums/commons – 15 minutes.
    f. Work/storage/custodial Spaces – 5 minutes.

D. Initial device settings and any additional information shown on the drawings shall be finalized at the pre-submittal meeting.

E. Stepped Daylight-Harvesting, Field Settings, and Adjustments

1. Sensor operation shall be based upon an open-loop control method. Placement, installation, and programming of device shall be in accordance with the manufacturer's installation instructions and recommendations
2. During nighttime hours (no daylight), with all lights turned on, determine the average lighting level (foot-candles) at 30-inches AFF throughout the space. This value shall be regarded as the design level.
3. During early or late daytime hours, with lights turned off, determine the sensor reading at a moment when the average lighting level at 30-inches AFF slightly exceeds the design level. Then, adjust the sensor's "lights-on" setpoint to be equal to this sensor reading.
4. Adjust the "lights-off" setpoint (daylight-harvesting mode) so that it is 50 percent above the "lights-on" setpoint.
5. Witness the operation of every sensor at both setpoints to confirm correct operation. Record observations, including room lighting levels at each setpoint.

F. Continuous Dimming Daylight-Harvesting, Field Settings, and Adjustments

1. Sensor operation shall be based upon a closed-loop control method. Placement, installation, and programming of device shall be in accordance with the manufacturer's installation instructions and recommendations.
2. During nighttime hours (no daylight), with all lights turned on and turned up 100%, determine the average lighting level (foot-candles) at 30-inches AFF throughout the space. This value shall be regarded as the design level.

3. Program and calibrate dimmable daylighting system to maintain this design level throughout the daylight hours and to turn the lights off completely whenever the lighting levels exceed the design levels by 10%.
4. Interior Daylight-Harvesting Photoelectric Sensor Footcandle (fc) Settings

    a. General Classrooms – 35 fc
    b. Specialty classrooms – 55 fc
    c. Music classrooms – 50 fc
    d. Corridors – 30 fc
    e. Offices/conference rooms – 35 fc
    f. Gymnasiums/commons – 40 fc

5. Manufacturer's representative shall include in contract field-verification and adjustment of all daylight-harvesting photoelectric sensors to achieve the average footcandle settings within the daylight-harvesting zone at 2.5 ft. above the floor.

G. BAS Controls – Coordination and Integration

1. Prior to bidding, coordinate with the Division 23 temperature control contractor for wiring, integrating, and programming of building automation system (BAS) to control lighting contactors as indicated. Refer to the drawings for specific zones of control and time scheduling requirements. Coordinate final settings directly with the Owner.

3.7 SYSTEM STARTUP AND SYSTEM COMMISSIONING

A. System Startup: Manufacturer's authorized technician shall confirm proper installation and operation of system components.

1. Confirm lighting controls are located, installed, and adjusted as required by the factory and the contract documents for each room.
2. Verify operation of each lighting control device as specified. Measure light levels throughout the room with a grid spacing of no greater than five foot on-center and adjust each photo sensor to confirm uniform light levels in compliance with values listed in the initial footcandle settings listed in the contract documents. Confirm time-delay settings comply with initial time-delay settings listed in the contract documents.
3. Verify lighting controls function as a complete and operational system to meet requirements of the Energy Code and the contract documents.
4. Manufacturer shall submit test documentation for each room including light level grid showing light levels and time delay test results and a written statement verifying that system meets above requirements. Include copy of test reports in the Operation and Maintenance Manual.

B. Factory authorized representative will be available for a pre-wiring meeting to review submittal drawings, recommended wiring practices and programing requirements.

C. Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system. Provide notice no-less than three weeks prior to a startup visit. Several business days may be required to confirm dates and times.

D. The Division 26 contractor shall provide both the manufacturer's representative and the electrical engineer with ten working days written notice of the system startup and adjustment date.

E. Provide written or computer-generated documentation on the commissioning of the system including room by room description including:

1. Sensor parameters, time delays, sensitivities, and daylight-harvesting setpoints.
2. System programming (e.g., manual on, auto off, dimming levels, zone switching, etc.).

F. Re-commissioning: After 30 days from occupancy re-calibrate all sensor time-delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect/Owner of re-commissioning activity.

3.8 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Nonconforming Work:

1. Lighting control devices will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

C. Prepare test and inspection reports.

D. Manufacturer Field Services and Commissioning:

1. Engage factory-authorized service representative to perform field tests/inspections and to make any necessary adjustments to lighting control systems and devices.

3.9 ADJUSTING

A. Occupancy Adjustments: When requested by Owner within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose, including up to 10 hours of labor plus the necessary travel time.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylight-harvesting controls, adjust set points and deadband controls to suit Owner's operations.

3.10 DEMONSTRATION

A. Coordinate demonstration of products and training of Owner's maintenance personnel to adjust, operate, and maintain lighting control devices. Refer to Division 01 Section "Demonstration and Training" for requirements, excluding requirements related to video-recordings. Include in this contract training/demonstration time plus any necessary travel time/expenses.

1. Digital Lighting Management Systems: 2 hours
2. Lighting Contactors: 0.5 hour.
3. Daylight-Harvesting Sensors: 1 hour.
4. Occupancy and Vacancy Sensors: 1 hour.
5. Emergency Lighting Shunt Relays: 0.5 hour.

3.11 MAINTENANCE

A. Software and Firmware Service Agreement: Install and program software upgrades that become available as specified above.

END OF SECTION 26 09 23

SECTION 263323.11
CENTRAL BATTERY EQUIPMENT FOR EMERGENCY LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Interruptible (fast-transfer) central battery equipment.
   2. Enclosures.
   3. Optional and accessory features.

1.3 DEFINITIONS

A. DDC: Direct digital control.

B. IBC: International Building Code.

C. Interruptible: As used in the Section Text, an off-line, passive-standby or line-interactive, inverter-only unit, with an intentional interruption of power to the load until an internal transfer switch picks up and transfers the load to the unit's inverter and internal battery source on loss of the "normal" source, and then retransfers to the "normal" source when it is restored. Transfer time can be "slow" (up to approximately 1 second) or "fast" (2-4 ms or 40-50 ms, depending on manufacturer).

D. LED: Light-emitting diode.

E. Low Voltage: As defined in the CEC for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

F. NiCd: Nickel cadmium.

G. OCPD: Overcurrent protective device.

H. PC: Personal computer.

I. PWM: Pulse-width modulated.

J. TDD: Total demand (harmonic current) distortion (also listed as "THD" in catalog data by manufacturers).

K. THD(V): Total harmonic voltage demand.

L. Uninterruptible: As used in the Section Text, an on-line, double-conversion (rectifier/inverter) unit, with no interruption of power to the load on interruption and restoration of the "normal" source.

M. UPS: Uninterruptible power supply.

N. VRLA: Valve-regulated lead acid.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and rating of central battery equipment unit.

1. Include features, performance, electrical ratings, operating characteristics, shipping and operating weights, shipping splits, and furnished options, specialties, and accessories.

B. Shop Drawings: For each type and rating of central battery equipment unit.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, ventilation requirements, method of field assembly, components, and location and size of each field connection.
3. Include system one-line diagram, internal and interconnecting wiring; and diagrams for power, signal, and control wiring.
4. Include elevation, details, and legends of control and indication displays.
5. Include -circuit current (withstand) rating of unit.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout, required working clearances, and required area above and around central battery equipment. Show central battery equipment layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.

B. Qualification Data: For Installer and testing agency.

C. Seismic Qualification Data: For central battery equipment, accessories, and components, from manufacturer.

1. Certificate of compliance.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Product Certificates: For each type of central battery equipment.

E. Harmonic Analysis Study and Report: Comply with IEEE 399 and NETA Acceptance Testing Specification; identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze designated operating scenarios, including recommendations for input filtering of central battery equipment to limit TDD and THD(V) to specified levels.

F. Source quality-control reports.

G. Field quality-control reports.

H. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For central battery equipment to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

   a. Manufacturer's written instructions for testing central battery equipment.
   b. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
   c. Manufacturer's written instructions for selecting and setting field-adjustable controls and status and alarm points

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Owner.

1. Fuses: One for every 10 of each type and rating, but no fewer than five of each type.
2. Output Circuit Breakers: One for every 10 of each type and rating, but no fewer than five of each type.
3. Output Circuit Breaker Open/Tripped Alarm Contacts: One for every 10 supplied, but no fewer than five of each type.
4. Cabinet Ventilation Filters: One complete set.
5. Circuit Board: One spare circuit board for each critical circuit.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Testing Agency Qualifications: Member company of NETA or an NRTL acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in fully enclosed vehicles.

B. Store equipment in spaces having environments controlled within manufacturers' written instructions for ambient temperature and humidity conditions for non-operating equipment.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Less than 0 deg F (minus 18 deg C) or exceeding 104 deg F (40 deg C), with an average value exceeding 95 deg F (35 deg C) over a 24-hour period.
2. Ambient Storage Temperature: Not less than minus 4 deg F (minus 20 deg C) and not exceeding 140 deg F (60 deg C).
3. Humidity: More than 95 percent (condensing).
4. Altitude: Exceeding 3300 feet (1000 m).

B. Interruption of Existing Electrical Distribution Systems: Do not interrupt electrical distribution systems within facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Architect, Construction Manager, and Owner no fewer than two days in advance of proposed interruption of electrical systems.
2. Indicate method of providing temporary electrical service.
3. Do not proceed with interruption of electrical systems without Construction Manager's and Owner's written permission.
4. Comply with NFPA 70E.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for central battery equipment, including clearances between central battery equipment and adjacent surfaces and other items.

1.11 COORDINATION

A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.

1.12 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace central battery equipment that fails in materials or workmanship within specified warranty period. Special warranty, applying to batteries only, applies to materials only, on a prorated basis, for period specified.

1. Warranty Period: Include the following warranty periods, from date of Substantial Completion:

   a. Central Battery Equipment (excluding Batteries): One year(s).
   b. Standard VRLA Batteries:

      1) Full Warranty: One year(s).
      2) Pro Rata: Nine years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Central battery equipment shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. The designated central battery equipment shall be tested and certified by an NRTL as meeting ICC-ES AC 156 test procedure requirements.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.2 INTERRUPTIBLE (FAST-TRANSFER) CENTRAL BATTERY EQUIPMENT

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Crucial Power
2. Myers
3. **Exitronix**
4. **Fortress**
5. **Linx**
6. **Cooper/Sure-Lites**

B. General Requirements for Interruptible (Fast-Transfer) Central Battery Equipment:

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the CEC, by a qualified testing agency, and marked for intended location and application.
2. NRTL Compliance: Fabricate and label central battery equipment to comply with UL 924 and UL 1778.
3. Comply with the IBC, the CEC, and NFPA 101.
4. Comply with NEMA PE 1.

C. Performance Requirements:

1. Fast-Transfer Central Battery Equipment: Line-interactive (on-line) system. Automatically sense loss of normal ac supply and use a solid-state static switch to transfer load. Transfer in 2-4 ms or less from normal supply to battery-inverter supply.
2. Automatic Operation:

a. Normal Conditions: Supply the load with ac power flowing from normal ac power input terminals, bypassing inverter, with battery connected in parallel via rectifier/charger output.
b. Abnormal Supply Conditions: If normal ac supply deviates from specified voltage, transfer switch operates and battery supplies constant, regulated ac power through the inverter to the load, with a momentary loss of power to the load.
c. If normal power fails, transfer switch operates and battery supplies constant, regulated ac power through the inverter to the load, with a momentary loss of power to the load.
d. If a fault occurs in system when being supplied by inverter and current flows in excess of the overload rating of inverter, inverter automatically protects itself against damage from overloads and short circuits by shutting down.
e. When normal ac power is restored at input supply terminals of unit, controls automatically retransfer the load back to the normal ac supply, with a momentary loss of power to the load. Rectifier/charger then recharges battery.
f. If normal power failure is prolonged (more than 90 minutes), integral low-voltage battery protective circuit disconnects battery and prevents battery from damage due to deep discharge.
g. If battery becomes discharged, and when normal ac supply is again available, rectifier/charger recharges battery. When battery is fully charged, rectifier/charger automatically shifts to float-charge mode.
h. If battery is disconnected, and normal ac power is available, central battery equipment continues to supply power to the load with no degradation of its regulation of voltage and frequency of output bus.

D. Unit Operating Requirements:

1. Input AC Voltage Tolerance: Plus 10 and minus 15 percent of central battery equipment input voltage rating.
2. Input Frequency Tolerance: Plus or minus 3 percent of central battery equipment frequency rating.
3. Synchronizing Slew Rate: 1 Hz per second, maximum.
4. Minimum Off-Line Efficiency: 99 percent at 60 Hz, full load.
5. Minimum Displacement Primary-Side Power Factor: 96 percent under any load or operating condition.
6. Ambient Temperature Rating (Other Than Batteries): Not less than 68 deg F (20 deg C) and not exceeding 86 deg F (30 deg C).
7. Ambient Storage Temperature Rating (Other Than Batteries): Not less than minus 4 deg F (minus 20 deg C) and not exceeding 158 deg F (70 deg C).
8. Ambient Temperature Rating (Batteries): Not less than 32 deg F (0 deg C) and not exceeding 104 deg F (40 deg C).
9. Ambient Storage Temperature Rating (Batteries): Not less than 0 deg F (minus 18 deg C) and not exceeding 104 deg F (40 deg C).
10. Humidity Rating: Less than 95 percent (noncondensing).
11. Altitude Rating: Not exceeding 3300 feet (1005 m).
12. Off-Line Overload Capability: 1.5 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.

E. Inverter and Controls Logic: Microprocessor based, isolated from all power circuits; provides complete self-diagnostics, periodic automatic testing and reporting; with alarms.

F. Controls and Indication:

1. Status Indication: Door-mounted, labeled LED indicators or digital screen displaying the following conditions:

a. Normal power available.
b. Status of system.
c. Battery charging status.
d. On battery power.
e. System fault.
f. External fault.

2. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.

a. Keypad: In addition to required programming and control keys, include the following:

1) Keys for METER, CONTROL, PROGRAM, and CLEAR modes.
2) Security Access: Provide electronic security access to controls through identification and password with at least two levels of access: View only; and view, operate, and service.
3) Control Authority: Supports at least three conditions: Off, local manual control at unit and local automatic control at unit.

b. Digital Display: Plain-English language messages on a digital display; provide the following historical logging information and displays:

1) Real-time clock with current time and date.
2) Tests and Events Logs: Record and store up to 50 tests and events.

a) Dates.
b) Times.
c) Durations.
d) Output voltage and currents.

3) Alarm Logs: Record and store up to 25 alarms.

a) Dates.
b) Times.
c) Alarm type.

4) Metering Functions: Display central battery equipment metering parameters including, but not limited to, the following:

a) Input and output voltage (V ac) and output current (A ac).

b) Battery voltage (V dc) and current (A ac).
c) Fault or alarming status (code).
d) Power output (VA).
e) Inverter load (W).
f) Ambient temperature (deg F).
g) System run time (cumulative days).
h) Inverter run time (cumulative minutes).

5) Alarm Functions: Digital display mounted flush in unit door and connected to display central battery equipment parameters including, but not limited to, the following:

a) High/low battery charge voltage.
b) High/low input voltage.
c) Battery nearing low-voltage condition.
d) Battery low voltage.
e) High ambient temperature.
f) Inverter fault.
g) Output fault.
h) Output overload.

3. Remote Signal Interfaces:

a. Remote Indication Interface: A minimum of one programmable (Form C) dry-circuit relay output(s) (120-V ac, 2 A) for remote indication of the following:

1) Fault or status indication.
2) On bypass.
3) Low battery.

b. Communications Interface: Factory-installed hardware and software to enable a remote PC to program central battery equipment and monitor and display status and alarms.

1) Communications Ports: RS-485.
2) Network Communications Ports: Ethernet RS-485.
3) Compliance with ASHRAE 135: Controllers shall support serial MS/TP and Ethernet IP communications, and shall be able to communicate directly via DDC system for HVAC RS-485 serial networks and Ethernet 10Base-T networks as a native device.

G. Self-Protection and Reliability Features:

1. Input transient protection by means of surge suppressors to provide protection against damage from supply voltage surges as defined in IEEE C62.45, Category B and C.
2. Integral, programmable, self-diagnostic and self-test circuitry; with alarms and logging.
3. Battery deep-discharge and self-discharge protection; with alarms.
4. Battery self-test circuitry; with alarms and logging.

H. Integral Input Disconnecting Means and OCPD: Thermal-magnetic circuit breaker, complying with UL 489.

1. Integrated Equipment Minimum Short-Circuit Current (Withstand) Rating: 22 kA.

I. Inverter:

1. Description: Solid-state, high-frequency, PWM type, with the following operational features:

a. Automatically regulate output voltage to within plus or minus 3 percent, for all load ranges and for maximum 25 percent step-load changes; regulation may increase to 8 percent for 100 percent step-load changes.
b. Automatically regulate output frequency to within plus or minus 1 Hz, from no load to full load, at unity power factor, over the operating range of battery voltage.
c. Output Voltage Waveform: Sine wave with maximum 3 percent TDD throughout battery operating-voltage range, for 100 percent linear load.
d. Inverter Overload Capability: 115 percent for 10 minutes; 150 percent surge for 10 seconds.
e. Load Power Factor: 0.5 lead to 0.5 lag.
f. Brownout Protection: Produces rated power without draining batteries when input voltage is down to 75 percent of normal.

J. Rectifier/Battery Charger:

1. Description: Solid state, variable rate, temperature compensated; automatically maintains batteries in fully charged condition when normal power is available.
2. Maximum Battery Recharge Time from Fully Discharged State: 24 hours.
3. Low-voltage disconnect circuit reduces battery discharge during extended power outages, monitors battery voltage, and disconnects inverter when battery voltage drops to no less than 85.7 percent of nominal voltage.

K. Batteries:

1. Description: Standard VRLA batteries.

a. Capable of sustaining full-capacity output of inverter unit for minimum of 90 minutes.

2. Battery Disconnect and OCPD: Manufacturer's standard.

L. Maintenance Bypass Systems:

1. Maintenance Bypass Mode:

a. Internal; manual operation only; bypasses central battery equipment power circuits (inverter and static transfer switch); requires local operator selection at central battery equipment. Transfer and retransfer shall be make-before-break, without disrupting power to the load or causing system instabilities.

b. External; manual operation only; bypasses central battery equipment completely; requires local operator selection at external switch enclosure remote from central battery equipment. Transfer and retransfer shall be make-before-break, without disrupting power to the load or causing system instabilities.

2. Bypass Overload Capability: 1.5 times the base load current.

M. Integral Output Disconnecting Means and OCPD:

1. Single-Output OCPD: Thermal-magnetic circuit breaker, complying with UL 489; manufacturer's standard ratings based on unit output ratings.
2. Multiple-Output OCPDs: Thermal-magnetic circuit breakers, complying with UL 489; voltage rating matching unit output voltage rating; 20 A, single pole.

a. Normally Closed: 2; with trip alarm.
b. Normally Open: 2; with trip alarm.

2.3 ENCLOSURES

A. Central Battery Equipment Enclosures: NEMA 250, to comply with environmental conditions at installed location.

1. Dry and Clean Indoor Locations: Type 1 steel cabinets with access to components through hinged doors with flush tumbler lock and latch.
2. Finish: Manufacturer's standard baked-enamel finish over corrosion-resistant prime treatment.

2.4 OPTIONAL AND ACCESSORY FEATURES

A. Factory-Installed Options and Accessories:

1. Multiple-Output Voltages: Supply unit branch circuits at different voltage levels if required. Transform voltages internally as required to produce indicated output voltages.
2. Split-Output Configuration: Divides output into normally on and normally off buses.
3. Auto-dialer.
4. Internal fax modem.
5. Audible alarm with silencer switch.
6. Remote Summary Alarm Panel: Labeled LEDs on panel faceplate shall indicate five basic status conditions. Audible signal indicates alarm conditions; silencing switch in face of panel silences signal without altering visual indication.

a. Cabinet and Faceplate: Surface or flush mounted to suit mounting conditions indicated.
b. Maximum Distance from Main Unit: 1000 feet (304 m).

7. Remote Meter Panel: Match equipment requirements of remote monitoring, controlling, and programming of central battery equipment.

a. Cabinet and Faceplate: Surface or flush mounted to suit mounting conditions indicated.
b. Maximum Distance from Main Unit: 150 feet (46 m).

2.5 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate central battery equipment fabricator's quality-control and testing methods.

B. Testing: Test and inspect central battery equipment according to UL 924 and UL 1778.

C. Factory Tests: Test and inspect assembled central battery equipment, by a qualified testing agency, according to UL 924 and UL 1778. Affix standards organization's label. Include the following:

1. Functional test and demonstration of all functions, controls, indicators, sensors, and protective devices.
2. Full-load test.
3. Transient-load response test.
4. Overload test.
5. Power failure test.

D. Central battery equipment will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store central battery equipment according to NECA 411.

B. Examine areas, surfaces, and substrates to receive central battery equipment, with Installer present, for compliance with requirements for installation tolerances, structural support, ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment will be installed, before installation begins.

C. Examine equipment before installation. Reject equipment that is wet, moisture damaged, or mold damaged.

D. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

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

3.2 HARMONIC ANALYSIS STUDY

A. Perform a harmonic analysis study to identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze designated operating scenarios, including recommendations for central battery equipment input filtering to limit TDD and THD(V) to specified levels.

B. Prepare a harmonic analysis study and report complying with IEEE 399 and with NETA Acceptance Testing Specification.

3.3 INSTALLATION

A. Coordinate layout and installation of central battery equipment with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install central battery equipment and accessories according to NECA 411.

C. Wall-Mounted Central Battery Equipment: Install central battery equipment on walls with tops at uniform height and with disconnect operating handles not higher than 79 inches (2000 mm) above finished floor unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For units not on walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

D. Suspended-Mounted Central Battery Equipment: Suspend central battery equipment from structural ceiling components using hangers, clamps, and associated fittings, designed for types and sizes of units to be supported. Provide support devices complying with Section 260529 "Hangers and Supports for Electrical Systems."

E. Floor-Mounted Central Battery Equipment: Install central battery equipment on 4-inch (100-mm) nominal-thickness concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) 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.

F. Seismic Bracing: Comply with requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

G. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

H. Comply with NECA 1.

I. Wiring Methods:
   1. Install cables in raceways and cable trays except within consoles, cabinets, desks, counters, accessible ceiling spaces, and gypsum board partitions where unenclosed wiring method may be used.
   2. Conceal raceway and cables except in unfinished spaces.
   3. Provide plenum-rated cable, where installed exposed or in open cable tray, within environmental airspaces, including plenum ceilings.
   4. Comply with requirements for cable trays specified in Section 260536 "Cable Trays for Electrical Systems."
   5. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

J. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.4 CONNECTIONS

A. Connections: Interconnect system components. Make connections to supply and load circuits according to manufacturer's wiring diagrams unless otherwise indicated.

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

   1. Separately Derived Systems: Make grounding connections to grounding electrodes and bonding connections to metallic piping systems as indicated; comply with the CEC.

C. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.5 INSTALLATION OF CONTROL WIRING

A. Install wiring between central battery equipment and remote devices and facility's central-control system. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."

B. Bundle, train, and support wiring in enclosures.

3.6 IDENTIFICATION

A. Identify central battery equipment, components, and control wiring. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

   1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
   2. Label central battery equipment with engraved nameplates.
   3. Label each separate cabinet, for multicabinet units.

4. Label each enclosure-mounted control and pilot device.

B. Operating Instructions: Frame printed operating instructions for central battery equipment, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of central battery equipment units.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Acceptance Testing Preparation:

1. Inspect and Test Each Component:

   a. Inspect wiring, components, connections, and equipment installations. Test and adjust components and equipment.
   b. Test insulation resistance for all external branch circuit, feeder, control, and alarm wiring connected to central battery equipment element and component.
   c. Test continuity of each circuit.

E. Tests and Inspections:

1. Inspect central battery equipment, wiring, components, connections, and equipment installation. Test and adjust components and equipment.
2. Test insulation resistance for all external branch circuit, feeder, control, and alarm wiring connected to central battery equipment element and component.
3. Test continuity of each circuit.
4. Verify that input voltages and frequencies at central battery equipment locations are within voltage and frequency limits specified in Part 2. If outside this range, notify Architect, Construction Manager, and Owner before closing input OCPDs.
5. Perform each visual and mechanical inspection and electrical test stated in manufacturer's written instructions and in NETA Acceptance Testing Specification, including specifically those for batteries, battery chargers, and UPS, regardless of the type of central battery equipment provided. Certify compliance with test parameters.
6. Perform a load-duration test at rated voltage and rated output current to verify the correct functional operation of the unit under full-load stable operating conditions for the minimum time limits required by UL 924. Monitor and record ambient temperature and temperatures within the unit.
7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
8. Perform the following infrared (thermographic) scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of central battery equipment. Remove front panels so joints and connections are accessible to portable scanner.
b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of central battery equipment 11 months after date of Substantial Completion.
c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

9. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

F. Central battery equipment will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports, including a certified report that identifies central battery equipment and describes all test results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.8 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.9 ADJUSTING

A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.

B. Set field-adjustable switches, auxiliary relays, and other adjustable parts.

C. Adjust the trip settings of thermal-magnetic circuit breakers with adjustable, instantaneous-trip elements; install fuses if not factory installed.

D. Set the automatic system test parameters.

E. Set field-adjustable, circuit-breaker trip ranges as specified in Section 260573.16 "Coordination Studies."

3.10 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.

B. Replace central battery equipment whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.11 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain central battery equipment, and to use and reprogram microprocessor-based control, monitoring, and display functions.

END OF SECTION 263323.11

SECTION 27 00 05
SPECIAL CONDITIONS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Communications equipment coordination and installation.
   2. Common communications installation requirements.

1.3 ABBREVIATIONS AND DEFINITIONS

A. Coordinate abbreviations listed here with abbreviations indicated on drawings. Bring any possible discrepancies to the attention of the Architect/Engineer/Designer for determination of which applies to which condition(s)

B. AASHTO: American association of State Highway and Transportation Officials.

C. AHJ: the Authority Having Jurisdiction.

D. ASTM: ASTM International, formerly known as American Society for Testing and Materials.

E. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.

F. BBC: Bonding Backbone Conductor, also commonly referred to as a BCT, Bonding Conductor for Telecommunications.

G. BICSI: Building Industry Consulting Service International.

H. Cable Runway: Also referred to as “Cable Ladder,” a relatively flat fabricated structure consisting of two longitudinal side rails (typically 1” to 1-1/2” high) connected by transverse members (typically 1” to 1-1/2” wide.)

I. Cable Tray: A “generic” term commonly referring to Basket Tray, Channel Cable Tray, Ladder Cable Tray, and/or Cable Runway.

J. Channel Cable Tray, also referred to as “Cable Channel”: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel.

K. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.

L. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

M. EMI: Electromagnetic interference.

N. EPDM: Ethylene-propylene-diene terpolymer rubber.

O. Ground(ing): more appropriately “Bonding” (or earthing), connecting metallic items together to reduce voltage potential to reduce injury and/or damage.

P. IDC: Insulation displacement connector.

Q. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails (typically 3” to 6” high) connected by individual transverse members (“rungs” typically 1” to 1-3/4” in diameter).

R. LAN: Local area network.

S. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.

T. NBR: Acrylonitrile-butadiene rubber.

U. NEMA: National Electrical Manufacturers Association.

V. NRTL: Nationally Recognized Testing Laboratory: A testing and labeling laboratory acceptable to the Authority Having Jurisdiction (examples include U.L and ETL)

W. OSP: Outside Plant

X. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.

Y. PBB: Primary Bonding Busbar, also commonly referred to as the TMGB, Telecommunications Main Grounding Bar.

Z. RCDD: Registered Communications Distribution Designer.

AA. SBB: Secondary Bonding Bar, also commonly referred to as the TGB, Telecommunications Ground Bar.

BB. Solid-Bottom (Nonventilated) Cable Tray: A fabricated structure consisting of longitudinal side rails and a bottom without ventilation openings.

CC. Trough (Ventilated Cable Tray): A fabricated structure consisting of longitudinal side rails and a bottom having openings for the passage of air.

DD. U.L.: Underwriter’s Laboratories, Inc.

EE. UTP: Unshielded twisted pair.

FF. WAN: Wide Area Network.

1.4 STANDARDS, Referenced in various Division 27 Documents:

A. Building Code and Edition noted in Codes Section of Documents

B. Electrical Code and Edition referenced in Codes Section of Documents.

C. ANSI/BICSI 001-2017, Information and Communication Technology Systems Design and Implementation Best Practices for Educational Institutions and Facilities

D. ANSI/BICSI 002-2019, Data Center Design and Implementation Best Practices

E. ANSI/BICSI 004-2018, Communication Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities

F. ANSI/BICSI 007-2017- Information Communication Technology Design and Implementation Practices for Intelligent Buildings and Premises

G. ANSI/BICSI 008-2018 - Wireless Local Area Network (WLAN) Systems Design and Implementation Best Practices

H. ANSI/BICSI N1-2019: Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure

I. ANSI/BICSI N2-17: Installation of Telecommunications and ICT Cabling to Support Remote Power Applications

J. ANSI/BICSI N3-20: Planning and Installation Methods for the Bonding and Grounding of Telecommunications and ICT Systems and Infrastructure

K. ANSI/TIA-568.0-E Generic Telecommunications Cabling for Customer Premises

L. ANSI/TIA-568.1-E Commercial Building Telecommunications Cabling Standard

M. ANSI/TIA-568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components Standards

N. ANSI/TIA-569-E, Telecommunications Pathways and Spaces.

O. ANSI/TIA-606-D, Administration Standard for Commercial Telecommunications Infrastructure.

P. ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

Q. ANSI/TIA TSB-162-B Telecommunications Cabling Guidelines for Wireless Access Points

R. ANSI/TIA-862-B, Structured Cabling Infrastructure Standard For Intelligent Building Systems

S. ANSI/TIA-942-D, Data Center Cabling

T. ANSI/TIA-1005-A, Telecommunications Infrastructure Standard for Industrial Premises

U. ANSI/TIA-1152-A, Requirements for Field Test Instruments and Measurements for Balanced Twisted Pair Cabling

V. ANSI/TIA-1179-B, Healthcare Facility Telecommunications Infrastructure Standard

W. ANSI/TIA-5017, Telecommunications Physical Network Security

X. BICSI; Telecommunications Distribution Methods Manual (TDMM), 14th Edition

Y. BICSI; Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition

Z. NESC: National Electrical Safety Code.

AA. TIA TSB-184-A Power Delivery (4-pair)

1.5 SUBMITTALS

A. Current Certifications for:
1. Installation Supervisor.
2. Installer(s).
3. Testing Supervisor.
4. Installer(s) as a “Manufacturer’s Certified Contractor.”

B. Firm demonstration of a minimum of 5 years’ experience installing structured cabling of the same or similar type and occupancy.

C. Reference list of 5 previous successful projects of similar size and scope including:
1. Name of project
2. Location of Project.
3. Description of work.
4. Time of Completion.
5. Clint’s name (an individual) as reference.
6. Contact information of Refence.

1.6 COORDINATION

A. Coordinate arrangement, mounting, and support of communications equipment:
1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 REFER TO OTHER DIVISION 27 SPECIFICATIONS FOR SPECIFIC PRODUCT REQUIREMENTS

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

A. Comply with NECA 1.

B. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

D. Right of Way: Give way to piping systems installed at a required slope.

E. Code and Standards Compliance: All work of this division shall be in accordance with the referenced codes and standards.

3.2 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 27 00 05

SECTION 27 05 26
GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Grounding conductors.
2. Grounding connectors.
3. Grounding busbars.
4. Grounding labeling.

1.3 DEFINITIONS

A. Refer to Section 27 00 05 and drawings for general Abbreviations and Definitions

B. BCT: Bonding conductor for telecommunications.

C. PBB- Primary Bonding Busbar (formerly TMGB: Telecommunications Main Grounding Busbar.

D. SBB – Secondary Bonding Busbar (formerly TGB: Telecommunications Grounding Busbar).

E. SBG – Supplementary Bonding Grid.

F. Service Provider: The operator of a service that provides telecommunications transmission delivered over access provider facilities.

G. TBB – Telecommunications Bonding Backbone.

H. TBC – Telecommunications Bonding Conductor.

I. TEBC – Telecommunicaitons Equipment Bonding Conductor.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For communications equipment room signal reference grid. Include plans, elevations, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:

1. Ground rods.
2. Ground and roof rings.
3. PBB, SBB, SBG, TBB, TBCs, locations and routings.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Result of the ground-resistance test, measured at the point of BCT connection.
b. Result of the bonding-resistance test at each TGB and its nearest grounding electrode.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
1. Field Inspector: Currently registered by BICSI as a RCDD to perform the on-site inspection.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

C. Comply with TIA-607.

2.2 CONDUCTORS

A. Comply with UL 486A-486B.

B. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.

1. TEBC ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
2. Cable Tray Equipment Grounding Wire: No. 6 AWG.
3. TBB grounding conductor shall be sized in accordance with ANSI-607, based on actual cable length.

C. Cable Tray Grounding Jumper:

1. Not smaller than No. 6 AWG and not longer than 12 inches (300 mm). If jumper is a wire, it shall have a crimped grounding lug with two holes and long barrel for two crimps. If jumper is a flexible braid, it shall have a one-hole ferrule. Attach with grounding screw or connector provided by cable tray manufacturer.

D. Bare Copper Conductors:

1. Solid Conductors: ASTM B3.
2. Stranded Conductors: ASTM B8.
3. Tinned Conductors: ASTM B33.
4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
5. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 CONNECTORS

A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

B. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.

1. Electroplated tinned copper, C and H shaped.

C. Signal Reference Grid Connectors: Combination of compression wire connectors, access floor grounding clamps, bronze U-bolt grounding clamps, and copper split-bolt connectors, designed for the purpose.

D. TEBC Busbar Connectors: Cast silicon bronze, solderless compression or exothermic-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.

E. TBB bonding conductor connections shall be non-reversible connections, either compression (hammer on) or exothermic type (no bolted connections allowed).

F. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING BUSBARS

A. PBB (TMGB): Predrilled, wall-mounted, rectangular bars of hard-drawn solid copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, 24 inches in length or length as indicated on Drawings. The busbar shall be NRTL listed for use as PBB and shall comply with TIA-607.

1. Predrilling shall be with holes for use with lugs specified in this Section.
2. Mounting Hardware: Stand-off brackets that provide a 2-inch (50-mm) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.
3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

B. SBB (TGB): Predrilled rectangular bars of hard-drawn solid copper, 1/4 by 2 inches (6.3 by 50 mm) in cross section, 12 inches in length or length as indicated on Drawings. The busbar shall be for wall mounting, shall be NRTL listed as complying with UL 467, and shall comply with TIA-607.

1. Predrilling shall be with holes for use with lugs specified in this Section.
2. Mounting Hardware: Stand-off brackets that provide at least a 2-inch (50-mm) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.
3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

C. Rack and Cabinet Grounding Busbars: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with TIA-607. Predrilling shall be with holes for use with lugs specified in this Section.

1. Cabinet-Mounted Busbar: Terminal block, with stainless-steel or copper-plated hardware for attachment to the cabinet.
2. Rack-Mounted Vertical Busbar: 72 inches (1827 mm) long, with stainless-steel or copper-plated hardware for attachment to the rack.

2.5 GROUND RODS

A. Ground Rods: Per electrical drawings and specifications.

2.6 IDENTIFICATION

A. Comply with requirements for identification products in Section 270553 "Identification for Communications Systems."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.

B. Inspect the test results of the ac grounding system measured at the point of BBC connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with connection of the BBC only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Bonding shall include the ac utility power service entrance, the communications cable entrance, and the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.

B. Comply with NECA 1.

C. Comply with TIA-607.

3.3 APPLICATION

A. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

1. The bonding conductors between the SBB and structural steel of steel-frame buildings shall be sized per ASNSI-607, and not smaller than No. 6 AWG.
2. The bonding conductors between the PBB and structural steel of steel-frame buildings shall be sized per ANSI-607 and not be smaller than No. 6 AWG.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2 AWG minimum.

C. Conductor Terminations and Connections:

1. Connect BBC to Main Electrical Power Ground Bar with irreversible connection.

2. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
3. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
4. Connections to Ground Rods at Test Wells (as noted on drawings): Bolted connectors.
5. Connections to Structural Steel: Welded connectors.

D. Grounding and Bonding Conductors:

1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
2. Install without splices.
3. Support at not more than 36-inch (900-mm) intervals.
4. Install grounding and bonding conductors in 3/4-inch (21-mm) PVC conduit until conduit enters a telecommunications room. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.

    a. If a grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing and bond both ends of the conduit to a PBB or SBB.

3.4 GROUNDING ELECTRODE SYSTEM

A. The BBC between the PBB and the ac service equipment ground shall be sized per ANSI-607 and not be smaller than No. 1/0 AWG.

3.5 GROUNDING BUSBARS

A. Install busbars horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 12 inches (300 mm) above finished floor unless otherwise indicated.

B. Where indicated on both sides of doorways, route BBC up to top of door frame, across top of doorway, and down; connect to horizontal bus.

3.6 CONNECTIONS

A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using TEBCs not smaller than No. 6 AWG.

B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.

C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:

1. Use crimping tool and the die specific to the connector.
2. Pretwist the conductor.
3. Apply an antioxidant compound to all bolted and compression connections.

D. Primary Protector: Bond to the PBB with insulated bonding conductor.

E. Interconnections: Interconnect all SBBs with the PBB with the BBC. If more than one BBC is installed, interconnect SBBs using the grounding equalizer conductor. The telecommunications backbone conductor and grounding equalizer conductor size shall not be less than 2

kcmils/linear foot (1 sq. mm/linear meter) of conductor length, up to a maximum size of No. 3/0 AWG unless otherwise indicated.

F. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install vertically mounted rack grounding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding busbar to the SBB with No. 2 AWG bonding conductors.

G. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each PBB and SBBto the vertical steel of the building frame.

H. Electrical Power Panelboards: Where an electrical panelboard for telecommunications equipment is located in the same room or space, bond each SBB to the ground bar of the panelboard.

I. Shielded Cable: Bond the shield of shielded cable to the cabinet/rack ground bar and the cabinet/rack ground bar to the SBB in communications rooms and spaces. Comply with TIA-568 when grounding shielded balanced twisted-pair cables.

J. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

K. Access Floors: Bond all metal parts of access floors to the SBB or PBB.

L. Equipment Room Signal Reference Grid: Provide a low-impedance path between telecommunications cabinets, equipment racks, and the reference grid, using No. 6 AWG bonding conductors.

1. Install the conductors in grid pattern on 4-foot (1200-mm) centers, allowing bonding of one pedestal from each access floor tile.
2. Bond the SBB or PBB of the equipment room to the reference grid at two or more locations.
3. Bond all conduits and piping entering the equipment room to the SBB or PBB at the perimeter of the room.

M. Towers and Antennas:

1. Ground Ring: Buried at least 30 inches (760 mm) below grade and at least 24 inches (610 mm) from the base of the tower or mounting.
2. Bond each tower base and metallic frame of a dish to the ground ring, buried at least 18 inches (460 mm) below grade.
3. Bond the ground ring and antenna grounds to the equipment room PBB or SBB, buried at least 30 inches (760 mm) below grade.
4. Bond metallic fences within 6 feet (1.8 m) of towers and antennas to the ground ring, buried at least 18 inches (460 mm) below grade.
5. Special Requirements for Roof-Mounted Towers:

a. Roof Ring: Meet requirements for the ground ring except the conductors shall comply with requirements in Section 264113 "Lightning Protection for Structures."
b. Bond tower base footings steel, the SBB in the equipment room, and antenna support guys to the roof ring.
c. Connect roof ring to at least 2 of the perimeter conductors of the lightning protection system.

6. Waveguides and Coaxial Cable:

a. Bond cable shields at the point of entry into the building to the PBB or SBB and to the cable entrance plate, using No. 2 AWG bonding conductors.
b. Bond coaxial cable surge arrester to the ground or roof ring using bonding conductor size recommended by surge-arrester manufacturer.

3.7 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.

B. Comply with IEEE C2 grounding requirements.

C. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) extends above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.

D. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect grounding conductors to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

3.8 IDENTIFICATION

A. Labels shall be preprinted or computer-printed type.

1. Label PBB(s) with "fs-PBB," where "fs" is the telecommunications space identifier for the space containing the PBB.
2. Label SBB(s) with "fs-SBB," where "fs" is the telecommunications space identifier for the space containing the SBB.
3. Label each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a PBB and a SBB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.

    a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.

3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.

    a. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the PBB and in each SBB. Maximum acceptable ac current level is 1 A.

C. Excessive Ground Resistance: If resistance to ground at any SBB exceeds 5 ohms, notify Architect promptly and include recommendations to reduce ground resistance.

D. Grounding system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 27 05 26

SECTION 27 05 27
EXTERIOR PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Optical-fiber-cable pathways and fittings.
4. Metal wireways and auxiliary gutters.
5. Nonmetallic wireways and auxiliary gutters.
6. Surface pathways.
7. Boxes, enclosures, and cabinets.
8. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

1. Division 26 Electrical requirements for Underground Ducts and Raceways for exterior ductbanks, manholes, and underground utility construction.

2. Section 270005 “Special Conditions for Communications Systems.0”

1.3 DEFINITIONS

A. Refer to Section 27 00 05 and drawings for definitions and abbreviations.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Civil and Landscape Design elements.

PART 2 - PRODUCTS

2.1 CONDUITS AND FITTINGS

A. General Requirements for Conduits and Fittings:

1. Refer to Division 26 requirements for Metal Conduits and Fittings.
2. Comply with TIA-569.
3. Comply with BICSI OSPDM.

2.2 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Allied Moulded Products, Inc.
2. Hoffman; a Pentair company.
3. Lamson & Sessions; Carlon Electrical Products.
4. Niedax-Kleinhuis USA, Inc.

B. General Requirements for Nonmetallic Wireways and Auxiliary Gutters:

1. Listed and labeled as defined in NFPA 70, by a NRTL, and marked for intended location and application.
2. Comply with TIA-569.

C. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.

D. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

E. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

F. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets:

1. Comply with TIA-569.
2. Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.

B. Device Box Dimensions: minimum size of 5 inches square by 2 ½ inches deep (125 mm square by 65 mm deep.

C. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 4X with continuous-hinge cover with flush latch and lockable unless otherwise indicated.

1. Metal Enclosures: Stainless Steel.

2. Nonmetallic Enclosures: Fiberglass.
   a. Finished inside with radio-frequency-resistant paint.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND CABLING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Comply with TIA-569-B.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Armorock.
   b. ConCast.
   c. NewBasis.
   d. NovaLight.
   e. Oldcastle Precast, Inc.;.
   f. Pittsburgh Pipe.
   g. Quazite, a Hubbell Industries brand.

2. Standard: Comply with SCTE 77.
3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, COMMUNICATIONS.
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes size as noted on drawings or minimum 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long).

2.5 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.
2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

A. Outdoors: Apply pathway products as specified below unless otherwise indicated:

1. Above grade Conduit: GRC or IMC, except as noted on drawings.
2. Underground Conduit: RNC, Type EPC-40-PVC concrete encased unless noted otherwise on drawings.
3. Boxes and Enclosures, Aboveground: NEMA 250, Type 4X.

B. Minimum Pathway Size, unless noted otherwise: 2-inch (50-mm) trade size.

C. Pathway Fittings: Compatible with pathways and suitable for use and location.

D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1, NECA 101, and TIA-569 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed.

B. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and below steam piping.

C. Complete pathway installation before starting conductor installation.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches (300 mm) of changes in direction. Utilize long radius ells for cables.

F. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches (300 mm) of enclosures to which attached.

H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

I. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on all conduits.

K. Install pathways square to the enclosure and terminate at enclosures with liquid-tight “Meyers” hubs.

L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

M. Cut conduit perpendicular to the length. For conduits of 2-inch (53-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

N. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg)tensile strength. Leave at least 12 inches (300 mm)of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.

O. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

P. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC[and EMT] conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115

mm per meter of length of straight run per deg C) of temperature change for metal conduits.

4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

Q. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements.

R. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

S. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

T. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.

D. Install handholes with bottom below frost line.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

F. Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 27 05 27

SECTION 27 05 28
INTERIOR PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Optical-fiber-cable pathways and fittings.
4. Metal wireways and auxiliary gutters.
5. Surface pathways.
6. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
2. Section 260533 "Raceways and Boxes for Electrical Systems" for conduits, wireways, surface raceways, boxes, enclosures, cabinets, handholes, and faceplate adapters serving electrical systems.
3. Section 270005 “Special Conditions for Communications Systems”

1.3 DEFINITIONS

A. Refer to Section 27 00 05 “Special Conditions for Communications Systems” and drawings for definitions and abbreviations.

1.4 ACTION SUBMITTALS

A. Product Data: For surface pathways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. LEED Submittals:
1. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive 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."

C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

D. Samples: For wireways, nonmetallic wireways and surface pathways and for each color and texture for final color/texture selection by Architect. Samples to be 12 inches (300 mm) long.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of pathway groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Provide products in compliance with Division 26 Specifications and this section.

B. General Requirements for Metal Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a NRTL, and marked for intended location and application.
2. Comply with TIA-569.

2.2 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Alpha Wire Company.
2. Arnco Corporation.
3. Endot Industries Inc.
4. IPEX.
5. Lamson & Sessions; Carlon Electrical Products.

B. Description: Comply with UL 2024; flexible-type pathway, approved for plenum installation unless otherwise indicated.

1. Listed and labeled as defined in NFPA 70, by a NRTL, and marked for intended location and application.
2. Comply with TIA-569.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper B-Line, Inc.
2. Hoffman; a Pentair company.
3. Mono-Systems, Inc.
4. Square D; a brand of Schneider Electric.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 or Type 4X as described in Part 3 or as otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed Type 4X and labeled as defined in NFPA 70, by a NRTL, and marked for intended location and application.
2. Comply with TIA-569.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Hinged, flanged-and-gasketed type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Allied Moulded Products, Inc.
2. Hoffman; a Pentair company.
3. Lamson & Sessions; Carlon Electrical Products.
4. Niedax-Kleinhuis USA, Inc.

B. General Requirements for Nonmetallic Wireways and Auxiliary Gutters:

1. Listed and labeled as defined in NFPA 70, by a NRTL, and marked for intended location and application.
2. Comply with TIA-569.

C. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.

D. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

E. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

F. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets:

1. Comply with Division 26 Specifications for electrical conditions for boxes, enclosures and cabinets.

2. Comply with TIA-569-B.
3. Boxes, enclosures and cabinets installed in wet locations shall be listed as NEMA 4X.

B. Device Box Dimensions: minimum size of 4-11/16 inches square by 2-1/2 inches deep (120 mm square by 65 mm deep).

C. Gangable boxes are prohibited.

D. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 or Type 4X as noted with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures:

   a. Material: Fiberglass.
   b. Finished inside with radio-frequency-resistant paint.

E. Fire Rated poke-through(s): Complying with UL fire rating for drilled hole insertion flush in the floor.

1. Legrand Evolution Series: 8AT Series.
2. Round “flush” 9-1/4 inch diameter die-cast aluminum cover assembly with sliding cable doors, finish to be selected by the Architect.
3. Power receptacle insert: Provide one power insert per poke-through, Catalog No. 68REC, with two 20 amp, 125 volt power receptacles.
4. Data Jack mounting plate: Provide one data jack mounting plate per poke through, Catalog No. 682A, with two data jacks as described in the Cabling Section and drawings.
5. AV mounting plates: Provide three Decora Device mounting plates per poke-through, Catalog No. 8DEC. Provide blank covers for unused openings, quantity of 1 per poke-through.

F. Cabinets:

1. NEMA 250, Type 1 except as noted, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.

3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

A. Outdoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC or IMC, except as noted on drawings.
2. Concealed Conduit, Aboveground: GRC or IMC, except as noted on drawings.
3. Underground Conduit: RNC, Type EPC-40-PVC concrete encased except as noted on drawings.
4. Boxes and Enclosures, Aboveground: NEMA 250, Type 4X.

B. Indoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC or IMC. Pathway locations include the following:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.
    d. Gymnasiums

4. Concealed in Ceilings and Interior Walls and Partitions: EMT, except as noted on drawings.
5. Damp or Wet Locations: GRC or IMC, except as noted on drawings.
6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical-fiber-cable pathway or EMT.
7. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: Riser-type, optical-fiber-cable pathway or EMT.
8. Boxes and Enclosures: NEMA 250 Type 1, except use NEMA 250 Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Pathway Size, unless noted otherwise: 1-1/4 inch (32-mm) trade size. Minimum size.

D. Pathway Fittings: Compatible with pathways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after

installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.

3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface pathways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

B. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and below steam piping.

C. Complete pathway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches (300 mm) of changes in direction. Utilize long radius ells for all optical-fiber cables.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches (300 mm) of enclosures to which attached.

I. Pathways Embedded in Slabs:

1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot (3-m) intervals.
2. Arrange pathways to cross building expansion joints at right angles with expansion fittings.
3. Arrange pathways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from RNC to GRC or IMC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for pathways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

N. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits of 2-inch (53-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

Q. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg)tensile strength. Leave at least 12 inches (300 mm)of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.

R. Surface Pathways:

1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
2. Install surface pathway with a minimum 2-inch (50-mm) radius control at bend points.
3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

S. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:

1. 1-Inch (25-mm) Trade Size and Smaller: Install pathways in maximum lengths of 50 feet (15 m).
2. 1 1/4-Inch (32-mm) Trade Size and Larger: Install pathways in maximum lengths of 75 feet (23 m).
3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

T. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway sealing fittings according to NFPA 70.

U. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service pathway enters a building or structure.
3. Where otherwise required by NFPA 70.

V. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

W. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC[and EMT] conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
    d. Attics: 135 deg F (75 deg C) temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to match Div 26 boxes, unless specifically noted otherwise.

Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

BB. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

CC. Set metal floor boxes level and flush with finished floor surface.

DD. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Install sleeves where cables penetrate interior walls and floor. Provide conduit support for all sleeves greater than (1) sleeve and all sleeves over 2 inch diameter.

B. Provide bushings on both ends of sleeves, prior to installation of cabling."

C. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Provide mechanical conduit seals to eliminate liquid entry.

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 27 05 28

SECTION 27 13 05
COMMUNICATIONS SINGLE MODE FIBER OPTIC CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. 8.7/125-micrometer, optical fiber cabling.
   2. Cable connecting hardware, patch panels, and cross-connects.

B. Related Sections:
   1. Section 27 00 05 Section "Special Conditions for Communications Systems."
   2. Division 26 for Electrical Requirements of Communications Systems.

1.3 DEFINITIONS

A. Refer to Section 27 00 05 and drawings for Definitions and Abbreviations.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Fiber optic cabling system shall comply with transmission standards in TIA/EIA-568, when tested according to test procedures of this standard.

1.5 SUBMITTALS

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

B. Shop Drawings:
   1. System Labeling Schedules: Example of labeling schedules.
   2. Cabling administration drawings and printouts.
   3. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.

C. Field quality-control reports:
   1. Example of field quality control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings and, Cabling Administration Drawings, and field testing program development by an RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician or Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569.

E. Grounding: Comply with ANSI-J-STD-607.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle cable in accordance with manufacturer’s recommendations.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.9 COORDINATION

A. Coordinate layout and installation of telecommunications cabling with Owner's telecommunications and LAN equipment and service suppliers.

PART 2 - PRODUCTS

2.1 OPTICAL FIBER CABLE

A. Manufacturers: Subject to compliance with requirements, provide cable by one of the following:
1. Belden.
2. Berk-Tek; a Leviton company.
3. Corning Cable Systems.
4. NextGen, a Prysmian brand.
5. Superior Essex.
6. Uniprise; a CommScope Inc. brand.

B. Description: Singlemode, 8.7/125-micrometer, fiber count as indicted on the drawings, nonconductive, tight buffer, optical fiber cable.
1. All strands to be Corning strands.
2. Cable to meet or exceed OS2 specifications.
3. Comply with ICEA S-83-596 for mechanical properties of indoor cable.

4. Comply with ICEA S-87-640 for mechanical properties of outdoor cable.
5. Comply with TIA/EIA-568 performance specifications.
6. Comply with TIA/EIA-492 detailed specifications.
7. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
   a. Plenum Rated, Nonconductive: Type OFNP , complying with UL.
   b. Plenum Rated, Conductive: Type OFCP , complying with UL.
8. Maximum Attenuation: 0.40 dB/km at 1310 nm; 0.30 dB/km at 1550 nm.

C. Jacket:
1. Jacket Color: Yellow for 8.7/125-micrometer cable.
2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

2.2 OPTICAL FIBER CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AFL Telecommunications.
2. Belden.
3. CommScope.
4. Corning Cable Systems.
5. Leviton
6. Panduit
7. Siemon Co. (The).

B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and/or blank positions adequate to suit 25% expansion.

C. Patch Cords: Factory-made, dual-fiber cables in 36-inch (900-mm) lengths.

D. Cable Connecting Hardware:
1. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3, and TIA/EIA-604-12. Comply with TIA/EIA-568.
2. Quick-connect, simplex and duplex, Type SC, Type ST, Type SFF, Type LC, or Type MT-RJ; as noted on drawings and as required to match active equipment (both contractor furnished and owner furnished) connectors. Insertion loss not more than 0.75 dB.

2.3 IDENTIFICATION PRODUCTS

A. Comply with TIA/EIA-606 and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
   1. Install plenum cable in environmental air spaces, including plenum ceilings.
   2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems" and Division 27 “Pathways for Communications Systems.”

B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible. Utilize Armored Cable or protect cables in Inner-Duct or conduit for their entire runs.

C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to termination points with fiber service loops (to allow future re-termination) without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:
   1. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
   2. Terminate all cables; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
   3. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
   4. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
   5. Bundle, lace, and train conductors to termination points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
   6. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
   7. Cold-Weather Installation: Bring cable to manufacturer’s recommended temperature before dereeling. Heat lamps shall not be used for heating.
   8. In the communications equipment room, install a minimum 10-foot- (3-m-) long service loop on each cable.
   9. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. Optical Fiber Cable Installation:
   1. Comply with TIA/EIA-568.
   2. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

D. Open-Cable Installation:
   1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
   2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Installation of Cable Routed Exposed under Raised Floors:
   1. Install plenum-rated cable only.
   2. Install cabling after the flooring system has been installed.

F. Installation of Cable Outdoor:
1. Install Indoor/Outdoor rated cable outdoors and in/under slabs on grade.

G. Group connecting hardware for cables into separate logical fields.

3.4 FIRESTOPPING

A. Comply with requirements in Division 07 Section "Penetration Firestopping."Comply with TIA/EIA-569, Annex A, "Firestopping."

B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.5 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607.

C. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.6 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606. Comply with requirements for identification specified in Division 27 Section "Identification for Communications Systems."
1. Administration Class: 4.
2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

B. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.

D. Cable and Wire Identification:
1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware.

E. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA 606, for the following:
1. Cables use flexible vinyl or polyester that flexes as cables are bent.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. Visually inspect optical fiber jacket materials for NRTL certification markings.
   2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
   3. Optical Fiber Cable Tests:
      a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
      b. Link End-to-End Attenuation Tests:
         1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526, Method B, One Reference Jumper.
         2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568.

C. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

D. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 27 13 05

SECTION 27 15 05
COMMUNICATIONS CABLING CAT6A

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. UTP cable.
2. Cable connecting hardware, patch panels, and cross-connects.
3. Telecommunications outlet/connectors.

B. Related Sections:
1. Specification Section 27 005 05 – Special Conditions for Division 27 for special conditions applicable to the furnishing and Installation of Division 27 systems.

1.3 DEFINITIONS

A. Refer to Specification Section 27 00 05 and drawings for abbreviations and definitions.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Category cabling system shall comply with transmission standards in TIA/EIA-568, when tested according to test procedures of the standard.

1.5 SUBMITTALS

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

B. Shop Drawings:
1. System Labeling Schedules: Example of labeling schedules.
2. Cabling administration drawings indicating proposed cable routings and termination locations.
3. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.

C. Samples: For workstation outlets, jacks, jack assemblies, in specified finish, one for each size and outlet configuration complete in faceplates for color selection and review of technical features.

D. Sample of “Field quality-control reports.”

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
   1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
   2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician or Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
   3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency and compliance to Electrical Code classification as plenum, riser or general use as appropriate and allowed for this project..

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive and store cables in accordance with manufacturer's requirements and recommendations.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels in accordance with manufacturer's requirements and recommendations.

1.9 COORDINATION

A. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Patch-Panel Units: One of each type.
   2. Connecting Blocks: One of each type.
   3. Device Plates: One of each type.
   4. Multiuser Telecommunications Outlet Assemblies: One of each type.

PART 2 - PRODUCTS

2.1 UTP CABLE – INDOOR PLENUM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Belden Inc.
   2. Berk-Tek; a Leviton company.
   3. CommScope, Inc.

4. General Cable, a Prysmian Group Company
5. Hubbell Premise Wiring
6. Molex Connected Enterprise Solutions.
7. Siemon Interconnect Solutions.
8. Superior Essex Communications
9. Systimax; a CommScope, Inc. brand.

B. Description: 100-ohm, 8-conductor (formed into 4-pairs) UTP, Category 6A covered with an overall jacket.
1. Conductors to be 23 AWG solid copper.
2. Comply with ICEA S-90-661 for mechanical properties.
3. Comply with TIA/EIA-568 for Category 6A performance requirements.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, NFPA 70, and NFPA 262 as Plenum Rated: CMP.
5. Capable of PoE Types 1, 2, 3 and 4 (90 watt minimum).
6. Jacket color(s) as noted on the drawings.

2.2 UTP CABLE – INDOOR/OUTDOOR PLENUM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Belden Inc.
2. Berk-Tek; a Leviton company.
3. CommScope, Inc.
4. General Cable, a Prysmian Group Company
5. Hubbell Premise Wiring
6. Molex Connected Enterprise Solutions.
7. Siemon Interconnect Solutions.
8. Superior Essex Communications
9. Systimax; a CommScope, Inc. brand.

B. Description: 100-ohm, 8-conductor (formed into 4-pairs) UTP, Category 6A covered with an overall jacket.
1. Conductors to be 23 AWG solid copper.
2. Overall jacket to be ruggedized to limit water ingress and sunlight resistant.
3. Cable to be “Gell-free” construction.
4. Comply with ICEA S-90-661 for mechanical properties.
5. Comply with TIA/EIA-568 for Category 6A performance requirements.
6. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, NFPA 70, and NFPA 262 as Plenum Rated: CMP.
7. Rated as CMX for outdoor use.
8. Capable of PoE Types 1, 2, 3 and 4 (90 watt minimum).
9. Jacket color(s) as noted on the drawings.

2.3 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Hubbell Premise Wiring.
2. Leviton Manufacturing Co., Inc.
3. Molex Connected Enterprise Solutions
4. Panduit Corp.
5. Siemon Interconnect Solutions.
6. Systimax, a CommScope, Inc., brand
7. TE Connectivity Ltd.

B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of Category 6A or higher.

C. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors or modular punch with matching jack for permanent termination of installed cables.
1. Number of Jacks per Field: One for each UTP cable minimum.

D. Faceplate Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
1. Jack color(s) as noted on drawings.

E. Patch Cords: Factory-made, four-pair cables in 36-inch (900 mm), 48-inch (1200-mm), 72-inch (1800 mm) and 120-inch (3000 mm); 50% of horizontal cables installed of each length for a total to match the twice the number of installed horizontal cables; all terminated with eight-position modular plug at each end.
1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
2. Patch cords shall be color coded and have color-coded boots for circuit identification.

2.4 TELECOMMUNICATIONS OUTLET/CONNECTORS

A. Jacks: Category 6A (or higher) 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568.

B. Workstation Outlets: Number of ports as indicated on the drawings, connector assemblies mounted in furniture of faceplate(s) as indicated on the drawings.
1. Faceplates:
2. Stainless Steel (polished, brushed, or painted as noted),
3. Brass,
4. High-impact plastic, (to match the electrical devices in the same area).
5. Coordinate color with Architect and Division 26 Section "Wiring Devices."
6. For use with snap-in jacks accommodating any combination of UTP, optical fiber, Audio Video and coaxial connectors.
7. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.5 GROUNDING

A. Comply with ANSI-J-STD-607.

2.6 IDENTIFICATION PRODUCTS

A. Comply with requirements in Division 27 Section "Identification for Communications Systems."

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except as noted on the drawings. Conceal cables except in unfinished spaces and as specifically noted.
1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements for raceways and boxes specified in Division 27 Section "Pathways for Communications Systems."

B. Wiring Method:
1. Conceal conductors and cables in accessible ceilings, walls, and floors.
2. Where cables are exposed, including in cable tray, cables shall be eclosed in inner duct or shielded with solid bottom tray panels.

C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:
1. Comply with TIA/EIA-568.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. MUTOA shall not be used as a cross-connect point.
4. Consolidation points may be used only as indicated on drawings:
5. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
8. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.
9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
12. In the communications equipment room, install a 10-foot- (3-m-) long service loop and at the “Workstation” end provide a 3-foot (1-m) service loop.
13. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.

2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable 6 feet (1800 mm) long not less than 12 inches (300 mm) in diameter below each feed point.

E. Installation of Cable Routed Outdoors and In/under Slab on Grade Floors:
1. Install Indoor/outdoor rated cable only.

F. Group connecting hardware for cables into separate logical fields.

G. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA/EIA-569 for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.3 FIRESTOPPING

A. Comply with requirements in Division 07 Section "Penetration Firestopping."

B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.4 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607.

3.5 IDENTIFICATION

A. Comply with requirements for identification specified in Division 27 Section "Identification for Communications Systems."
   1. Administration Class: 4.
   2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.

B. Using a digital method, develop Cabling Administration Drawings and Schedules for system identification, testing, and management. Use unique, alphanumeric designation in accordance with Client Requirements for each cable. Label all cable, jacks, connectors, and terminals to which a cable connects with same designation.

C. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

D. Paint and label colors for equipment identification shall comply with TIA/EIA-606 for Class 4 level of administration, including optional identification requirements of this standard.

E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606. Furnish electronic record of all drawings, in software and format selected by Owner.

F. Cable and Wire Identification:
   1. Label each cable within 4 inches (100 mm) of each termination, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
   2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
   3. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
      a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
      b. Label each unit and field within distribution racks and frames.
   4. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606.
   1. Use flexible vinyl or polyester on cables that flex as cables are bent.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. Visually inspect UTP cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568.

2. Visually confirm specified Category marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. UTP Performance Tests:
    a. Test for each outlet. Perform the following tests according to TIA/EIA-568:
        1) Wire map.
        2) Length (physical vs. electrical, and comparison to length requirements).
        3) Insertion loss.
        4) Near-end crosstalk (NEXT) loss.
        5) Power sum near-end crosstalk (PSNEXT) loss.
        6) Equal-level far-end crosstalk (ELFEXT).
        7) Power sum equal-level far-end crosstalk (PSELFEXT).
        8) Return loss.
        9) Propagation delay.
        10) Delay skew.
5. As ports are subjected to a “final performance verification tests after the complete communications cabling and workstation outlet/connectors are installed.
    a. Voice Tests: These tests assume that dial tone service has been installed. And test connection to a network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, making and receiving a local, long distance, and digital subscription line telephone call. Repair or replace any cable that fails.
    b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to test. Connecting to the network interface device at the demarcation point. Logging onto the network and ensuring proper connection to the network. Repair/replace all cables that fail final testing.

C. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as a program native file, a text files, and printed and submitted in all three forms.

D. End-to-end cabling will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

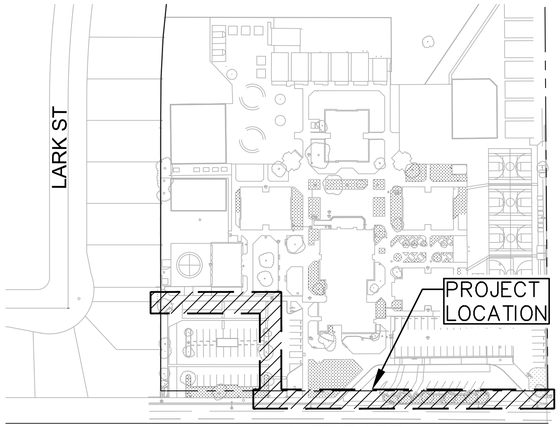
3.7 DEMONSTRATION

A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION 271500

OFF-SITE IMPROVEMENT PLANS
FOR
SANTA MARIA-BONITA SCHOOL DISTRICT
BATTLES ELEMENTARY SCHOOL

605 E BATTLES RD, SANTA MARIA, CA 93454



VICINITY MAP
SCALE: 1"=100' NORTH

CITY OF SANTA MARIA GENERAL NOTES

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND DRAWINGS OF THE CITY OF SANTA MARIA AND THE STANDARD SPECIFICATIONS OF THE STATE OF CALIFORNIA, BUSINESS AND TRANSPORTATION AGENCY, DEPARTMENT OF TRANSPORTATION, LATEST EDITION, WHERE NOT COVERED BY THE FORMER, AND SHALL BE COMPLETED TO THE SATISFACTION OF THE CITY ENGINEER.
2. ALL PLANS MUST BE SIGNED BY THE CITY ENGINEER WITHIN THE PAST YEAR AND ALL WORK MUST BE PERFORMED TO THE SATISFACTION OF THE CITY ENGINEER.
3. CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS AT LEAST ONE (1) WORKING DAY PRIOR TO BEGINNING OF CONSTRUCTION AT (805) 925-0951, EXT. 2225.
4. CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT (U.S.A.) AT LEAST TWO (2) WORKING DAYS PRIOR TO BEGINNING OF CONSTRUCTION AT 811. (GOVERNMENT CODE SECTION 4216)
5. CONTRACTOR SHALL PROVIDE A TRAFFIC CONTROL PLAN TO DEPARTMENT OF PUBLIC WORKS AT LEAST TWO (2) WEEKS PRIOR TO COMMENCEMENT OF WORK PRIOR TO ISSUANCE OF ENCROACHMENT PERMIT. (PERMIT WORK ONLY)
6. CONTRACTOR SHALL PRACTICE SAFETY AT ALL TIMES AND SHALL FURNISH, ERECT AND MAINTAIN SUCH FENCES, BARRICADES, LIGHTS AND SIGNS NECESSARY TO GIVE ADEQUATE PROTECTION TO THE PUBLIC AT ALL TIMES. TEMPORARY TRAFFIC CONTROL SHALL BE APPROVED BY THE CITY ENGINEER.
7. ALL EXCAVATIONS OR TRENCHES IN PAVED AREA SHALL REQUIRE SAWCUTTING IN A NEAT AND UNIFORM MANNER. ALL MATCH OR JOIN LINES TO EXISTING ASPHALTIC CONCRETE PAVING WITHOUT PAVEMENT HEADERS SHALL BE SAW CUT.
8. ALL UNDERGROUND UTILITIES SHALL BE INSTALLED PRIOR TO CONSTRUCTION OF STREET IMPROVEMENTS.
9. ALL SEWER LATERAL CROSSINGS OF PUBLIC WATER MAINS SHALL BE IN ACCORDANCE WITH STATE HEALTH SERVICE STANDARDS.
10. A CHISELED 'S' SHALL BE INSTALLED IN THE CURB FACE ABOVE ALL SEWER LATERALS. THE AS-BUILT SEWER LATERAL STATIONING SHALL BE SUBMITTED TO THE PUBLIC WORKS DEPARTMENT PRIOR TO FINAL ACCEPTANCE OF PUBLIC IMPROVEMENTS.
11. INFORMATION SHOWN AS EXISTING IMPROVEMENTS ON THESE DRAWINGS IS APPROXIMATE. THE CONTRACTOR SHALL VERIFY.
12. CONTRACTOR TO LOCATE, PROTECT, AND REPAIR AT HIS EXPENSE, ANY UTILITIES DAMAGED BY HIS FORCES.
13. THESE PLANS SHALL INCLUDE ALL AS-BUILT REVISIONS PRIOR TO THE ACCEPTANCE OF IMPROVEMENTS BY CITY.
14. BASIS OF BEARINGS: THE BENCHMARK IS THE TOP OF A MAGNETIC NAIL AND TIN SHINER SET IN THE ASPHALT OF A BASKETBALL COURT AND HAVING AN ELEVATION OF 230.66' PER OPUS SOLUTION (NAVD 88)
15. BENCHMARK: THE BASIS OF BEARINGS IS A LINE BETWEEN TWO FOUND CENTER LINE MONUMENTS IN STANDARD MONUMENT WELLS ON LARK STREET BEING 2" BRASS CAPS STAMPED "LS 3485" AND HAVING A BEARING OF N0°45'33"E AS SHOWN ON 151 MAPS 3
16. ALL STREETS, ALLEYS, VEHICULAR WAYS, SIDEWALKS, AND HAUL ROUTES SHALL BE KEPT CLEAN AND CLEAR OF DEBRIS, DIRT AND DUST IN A MANNER ACCEPTABLE TO THE CITY. AT A MINIMUM, THESE AREAS SHALL BE CLEANED AT THE END OF EACH WORK DAY. FAILURE TO DO SO WILL RESULT IN A "STOP WORK" NOTICE. SAID NOTICE WILL NOT BE RELEASED UNTIL THE AREA HAS BEEN ADEQUATELY CLEANED.
17. ALL VALVE AND MANHOLE COVERS TO BE ADJUSTED TO GRADE, PER CITY STANDARDS.
18. TABLES ON RD-21, RD-22, OR RD-23 SHALL BE USED TO DETERMINE ROADWAY SECTIONS PRIOR TO PAVING STREETS. ALTERNATE PAVEMENT DESIGN CRITERIA MAY BE PROPOSED FOR R VALUE GREATER THAN 5, USING THE TRAFFIC INDEX "T.I." SHOWN ON THE STANDARD DRAWING TABLES. DESIGNS SHALL CONFORM TO CALIFORNIA DEPARTMENT OF TRANSPORTATION DESIGN METHOD FOR FLEXIBLE PAVEMENTS. ALTERNATE PAVEMENT DESIGNS MUST BE PREPARED AND STAMPED BY A LICENSED CIVIL ENGINEER AND APPROVED IN WRITING BY THE CITY ENGINEER. "R" VALUE REPORT SHALL BE OBTAINED FROM A CIVIL ENGINEER AND BE PROVIDED TO THE DEPARTMENT OF PUBLIC WORKS PRIOR TO PAVING OF STREETS.
19. CONTRACTOR SHALL INSTALL SURVEY MONUMENTS WITHIN 0.04' OF LOCATIONS SHOWN BY SWING TIES SET BY THE SURVEYOR. THE SURVEYOR SHALL PUNCH CAP.
20. UNLESS OTHERWISE NOTED ON THE PLANS, ALL NEW CITY STANDARD (COBRA-HEAD STYLE) STREET LIGHTS SHALL BE OF A BRAND APPROVED BY THE CITY ENGINEER. CONTRACTOR SHALL SUBMIT ANY CHANGES TO STD. DWG. SL-11 THROUGH 17 NECESSARY FOR APPROVAL PRIOR TO STARTING WORK. DECORATIVE STYLE STREET LIGHTS SHALL BE OF THE TYPE AND CONSTRUCTION APPROVED BY THE CITY ENGINEER. ALL WORK SHALL SHOW POINT OF SERVICE.
21. CONTRACTOR SHALL HAVE COPIES OF THE APPROVED PLANS AND SPECIFICATIONS FOR THIS PROJECT ON THE SITE AT ALL TIMES, AND CONTRACTOR SHALL BE FAMILIAR WITH ALL APPLICABLE STANDARDS AND SPECIFICATIONS.
22. CONTRACTOR SHALL EXPOSE AND VERIFY THE LOCATION AND ELEVATION OF ALL EXISTING IMPROVEMENTS PRIOR TO BEGINNING WORK.
23. ALL CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH CITY OF SANTA MARIA STANDARD DRAWING(S) AND STANDARD SPECIFICATION(S) LISTED BELOW:

DRAWING NO.	TYPE OF CONSTRUCTION	CITY STD. SPECS
RD-12A		
RD-11		
RD-21		
RD3-33		
WA-27F		
WA-18B		
WA-29		

24. CONTRACTOR TO OBTAIN A PERMIT FROM DEPARTMENT OF INDUSTRIAL RELATIONS, DIVISION OF OCCUPATIONAL SAFETY & HEALTH. CALL OSHA AT (818) 901-5403 FOR FURTHER INFORMATION. (HEALTH & SAFETY CODE 17922.5)
25. ALL COMPACTION TEST RESULTS WITHIN RIGHT-OF-WAY AND EASEMENTS SHALL BE SUBMITTED DIRECTLY TO THE PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION BY APPROVED TESTING COMPANY AT TIME OF FIRST AVAILABILITY OF RESULTS.
26. ALL TRAFFIC CONTROL DEVICES SHALL BE INSTALLED AND CONFORM TO STATE OF CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA MUTCD).
27. PAVEMENT DELINEATION MATERIAL, MANUFACTURING, PACKAGING, LABELING, AND APPLICATION SHALL CONFORM TO STATE OF CALIFORNIA STANDARD SPECIFICATIONS, LATEST EDITION. ALL TRAFFIC STRIPES AND PAVEMENT MARKINGS SHALL BE INSTALLED PER CURRENT APPROVED STANDARDS.
28. CONTRACTOR SHALL OBTAIN AN ENCROACHMENT PERMIT FROM THE CITY OF SANTA MARIA DEPARTMENT OF PUBLIC WORKS – ENGINEERING DIVISION AT 110 S. PINE STREET, SUITE 221, PRIOR TO PERFORMING ANY WORK WITHIN PUBLIC RIGHT-OF-WAY OR EASEMENT.
29. CONTRACTOR IS RESPONSIBLE FOR PRESERVATION AND/OR PERPETUATION OF ALL EXISTING MONUMENTS WHICH CONTROL SUBDIVISIONS, TRACTS, BOUNDARIES, STREETS, HIGHWAYS, OR OTHER RIGHTS-OF-WAY, EASEMENTS, OR PROVIDE SURVEY CONTROL WHICH WILL BE DISTURBED OR REMOVED DUE TO CONTRACTOR'S WORK. CONTRACTOR SHALL PROVIDE A MINIMUM OF TEN (10) WORKING DAYS NOTICE TO PROJECT ENGINEER/SURVEYOR PRIOR TO DISTURBANCE OR REMOVAL OF EXISTING MONUMENTS. PROJECT ENGINEER/SURVEYOR SHALL COORDINATE WITH CONTRACTOR TO RESET MONUMENTS OR PROVIDE PERMANENT WITNESS MONUMENTS AND FILE THE REQUIRED DOCUMENTATION WITH THE COUNTY SURVEYOR PURSUANT TO BUSINESS AND PROFESSIONS CODE SECTION 8771

SOIL/MATERIAL WORK VERIFICATION:

I, THE UNDERSIGNED, AS THE SOILS ENGINEER OF RECORD, TO THE BEST OF MY KNOWLEDGE DO HEREBY VERIFY THAT THE SITE SOIL WORK WAS COMPLETED IN SUBSTANTIAL CONFORMANCE WITH APPROVED PLANS/SPECIFICATIONS, ADDENDA #, AND CHANGE ORDERS #. FURTHER, I HAVE BEEN OR SOMEONE UNDER MY RESPONSIBLE CHARGE HAS BEEN, ON-SITE A SUFFICIENT NUMBER OF OCCASIONS DURING THE COURSE OF THE IDENTIFIED EARTHWORK TO VERIFY OVERALL COMPLIANCE WITH APPLICABLE CRITERIA, AS MORE SPECIFICALLY NOTED BELOW.

1. GRADING (ROUGH/FINE) WITHIN THE R/W ASSOCIATED WITH THE APPROVED PLANS_____; AND

2. BACK FILL PLACEMENT/COMPACTION OF UTILITY SYSTEMS FOR IMPROVEMENTS SUCH AS (SEWER), (WATER), (GAS), (ELECTRICAL), (CABLE T.V.), (DRAINAGE), _____; AND

3. PAVEMENT RELATED WORK, SUCH AS (SUBGRADE), (BASE THICKNESS & COMPACTION), (PAVEMENT THICKNESS & COMPACTION).

_____
FIRM NAME DATE

BY: _____ _____
SOILS ENGINEER OF RECORD RGE NO.

ENGINEER OF RECORD CERTIFICATE:

THAT THE CONSTRUCTION OF PUBLIC IMPROVEMENTS CONTAINED WITHIN THIS SET OF PLANS WILL BE PERIODICALLY OBSERVED BY _____, THE CIVIL ENGINEER OF RECORD, AND THAT I, OWNER/DEVELOPER, WILL RETAIN AND BE RESPONSIBLE FOR PAYMENT THEREOF FOR OBSERVATION AND "AS-BUILT" PLAN SUBMITTAL. THE "AS-BUILT" PLANS SHALL BE SUBMITTED TO THE ENGINEERING DIVISION OFFICE AT LEAST TEN (10) WORKING DAYS PRIOR TO REQUEST FOR RELEASE OF SURETY FOR "FAITHFUL PERFORMANCE OF IMPROVEMENTS".

_____
OWNER/DEVELOPER DATE

SOILS ENGINEER OF RECORD CERTIFICATE:

I, OWNER/DEVELOPER, WILL RETAIN AND BE RESPONSIBLE FOR PAYMENT THEREOF, THE SOILS ENGINEER OF RECORD WHO WILL PROVIDE THE OBSERVATION AND TESTING SERVICES OF THIS GRADING, BACK FILL AND PAVEMENT WORK AND SHALL VERIFY THAT TO THE BEST OF HIS KNOWLEDGE THE EARTHWORK/TRENCH BACK FILL AND PAVING OPERATIONS WERE PERFORMED IN SUBSTANTIAL CONFORMANCE WITH THE APPROVED PROJECT PLANS AND SPECIFICATIONS.
THE SOILS WORK VERIFICATION SHALL BE SUBMITTED TO THE ENGINEERING DIVISION OFFICE AT LEAST TEN (10) WORKING DAYS PRIOR TO REQUEST FOR RELEASE OF SURETY FOR "FAITHFUL PERFORMANCE OF IMPROVEMENTS".

_____
OWNER/DEVELOPER DATE

811 Know what's below. Call 811 before you dig.

LEGEND

- PROPERTY LINE
- LOT LINE
- EXISTING EASEMENT
- CENTERLINE
- LIMIT OF WORK LINE
- SAWCUT LINE
- EXISTING ASPHALT CONCRETE PAVEMENT TO BE REMOVED
- EXISTING LANDSCAPE AREA TO BE REMOVED
- EXISTING CONCRETE PAVEMENT AND BASE COURSE INCLUDING REBAR TO BE REMOVED
- EXISTING LANDSCAPE AREA
- EXISTING CONCRETE PAVEMENT
- STANDARD DUTY CONCRETE PAVEMENT
- HEAVY DUTY ASPHALT CONCRETE PAVEMENT

DEMOLITION NOTES

- (X1) REMOVE EXISTING CONCRETE SIDEWALK AND BASE COURSE INCLUDING REBAR
- (X2) REMOVE AND PROPERLY DISPOSE OF EXISTING CURB AND GUTTER
- (X3) REMOVE AND PROPERLY DISPOSE OF EXISTING ASPHALT CONCRETE PAVEMENT AND BASE COURSE
- (X4) CLEAR AND GRUB EXISTING LANDSCAPE AREA
- (X5) REMOVE EXISTING GUTTER
- (X6) REMOVE EXISTING DIAMOND PLATE
- (X7) EXISTING IRRIGATION BACKFLOW PREVENTER TO BE REMOVED PER SEPARATE PLANS

PROTECTION NOTES

- [1] PROTECT-IN-PLACE EXISTING WATER VALVE
- [2] PROTECT-IN-PLACE EXISTING LIGHT POLE. CONTRACTOR TO RAISE TO FINAL GRADE.
- [3] PROTECT-IN-PLACE EXISTING WATER STRUCTURE
- [4] PROTECT-IN-PLACE EXISTING ASPHALT CONCRETE PAVEMENT
- [5] PROTECT-IN-PLACE EXISTING CURB AND GUTTER
- [6] PROTECT-IN-PLACE EXISTING CONCRETE SIDEWALK

CONSTRUCTION NOTES

- (1) CONSTRUCT DRIVEWAY PER CITY OF SANTA MARIA STD. DWG. RD-12A
- (2) CONSTRUCT SIDEWALK PER CITY OF SANTA MARIA STD. DWG. RD-11
- (3) CONSTRUCT CURB AND GUTTER PER CITY OF SANTA MARIA STD. DWG. RD-11
- (4) PROPOSED ASPHALT PAVEMENT PER CITY OF SANTA MARIA STD. DWG. RD-21
- (5) JOIN EXISTING CONCRETE CURB AND GUTTER
- (6) SAWCUT EXISTING CONCRETE CURB AND GUTTER

DOMESTIC WATER NOTES

- (1) INSTALL 6" PVC FIRE WATER LINE PER CITY OF SANTA MARIA STD. DWG. WA-18B. TRENCH PER CITY OF SANTA MARIA STD. DWG. RD3-33
- (2) INSTALL 6" BACKFLOW DEVICE PER CITY OF SANTA MARIA STD. DWG. WA-27F
- (3) HOT TAP EXISTING 10" WATER LINE PER CITY OF SANTA MARIA STD. DWG. WA-18B. CONTRACTOR TO COORDINATE CONNECTION WITH CITY INSPECTOR.
- (4) INSTALL 3" PVC DOMESTIC WATER LINE PER CITY OF SANTA MARIA STD. DWG. WA-18B. TRENCH PER CITY OF SANTA MARIA STD. DWG. RD3-33
- (5) INSTALL SALVAGED EXISTING CAMPUS DOMESTIC WATER METER
- (6) INSTALL 3" BACKFLOW DEVICE PER CITY OF SANTA MARIA STD. DWG. WA-29

PROTECTION NOTES

- [1] PROTECT IN PLACE EXISTING 10" WATER MAIN LINE
- [2] PROTECT-IN-PLACE EXISTING WATER VALVE
- [3] PROTECT-IN-PLACE EXISTING WATER STRUCTURE

SHEET INDEX

REGISTERED PROFESSIONAL ENGINEER — AHMED ZUWAWA — RCE NO. 92059 — STATE OF CALIFORNIA — CIVIL

REV.	BY	ITEM	APPROVED	DATE
0	AZ	ISSUE FOR PERMIT		

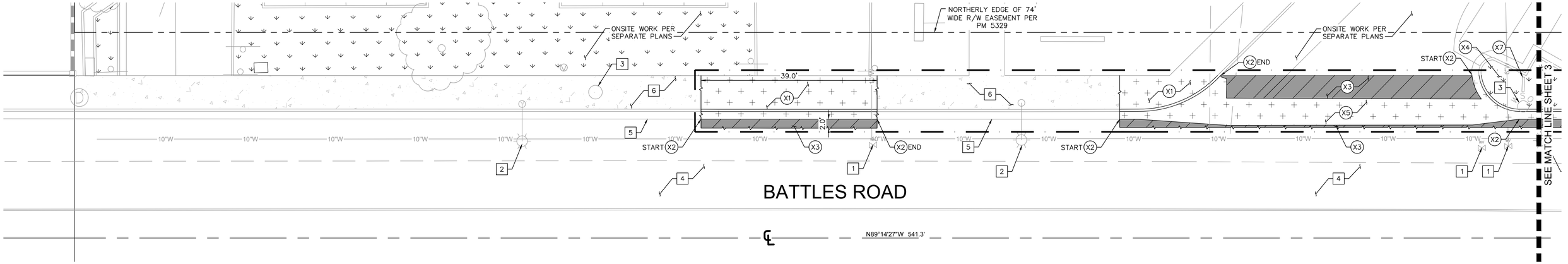
CITY OF SANTA MARIA
DEPARTMENT OF PUBLIC WORKS

SCALE | DATE | APPROVED:

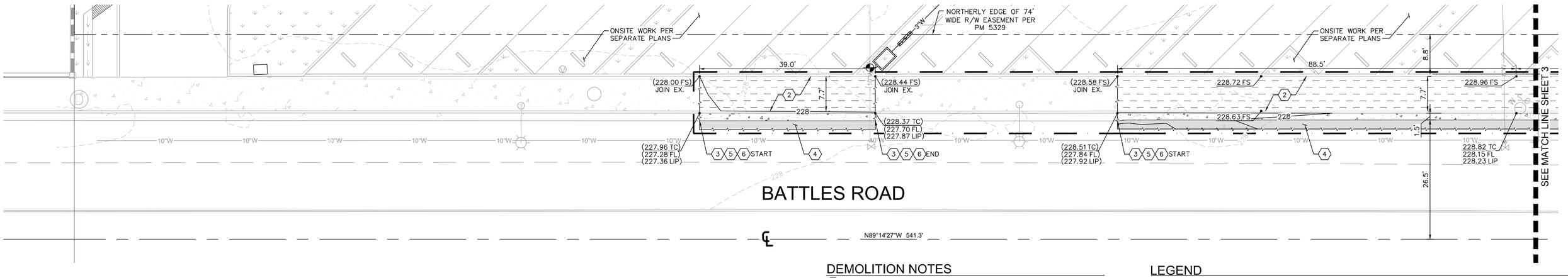
COVER SHEET AND GENERAL NOTES

DRAWN BY:	IV
CHECKED BY:	AZ
DATE:	3/18/2025
SHEET	1 OF 4 SHEETS
REFERENCES:	
FILE NO.	

DEMOLITION PLAN



IMPROVEMENT PLAN



DEMOLITION NOTES

- (X1) REMOVE EXISTING CONCRETE SIDEWALK AND BASE COURSE INCLUDING REBAR
- (X2) REMOVE AND PROPERLY DISPOSE OF EXISTING CURB AND GUTTER
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- (X4) CLEAR AND GRUB EXISTING LANDSCAPE AREA
- (X5) REMOVE EXISTING GUTTER
- (X6) REMOVE EXISTING DIAMOND PLATE
- (X7) EXISTING IRRIGATION BACKFLOW PREVENTER TO BE REMOVED PER SEPARATE PLANS

PROTECTION NOTES

- [1] PROTECT–IN–PLACE EXISTING WATER VALVE
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CONSTRUCTION NOTES

- ⟨1⟩ CONSTRUCT DRIVEWAY PER CITY OF SANTA MARIA STD. DWG. RD–12A
- ⟨2⟩ CONSTRUCT SIDEWALK PER CITY OF SANTA MARIA STD. DWG. RD–11
- ⟨3⟩ CONSTRUCT CURB AND GUTTER PER CITY OF SANTA MARIA STD. DWG. RD–11
- ⟨4⟩ PROPOSED ASPHALT PAVEMENT PER CITY OF SANTA MARIA STD. DWG. RD–21
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LEGEND

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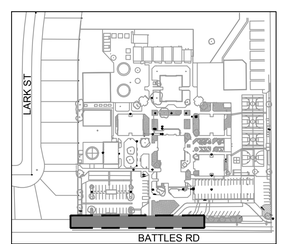
NORTH

GRAPHIC SCALE IN FEET
0 5 10 20

SCALE 1" = 10'
WHEN PRINTED FULL SIZE
24" X 36"



KEYMAP
SCALE 1"=200'

EXISTING UTILITY NOTE

THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST POTHOLE AND FIELD VERIFY THE LOCATION AND DEPTH OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO CIVIL ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.

811 Know what's below. Call 811 before you dig.

REGISTERED PROFESSIONAL ENGINEER — AHMED ZUWAWA — RCE NO. 82059 — CIVIL — STATE OF CALIFORNIA

REV.	BY	REVISIONS ITEM	APPROVED	DATE
0	AZ	ISSUE FOR PERMIT		

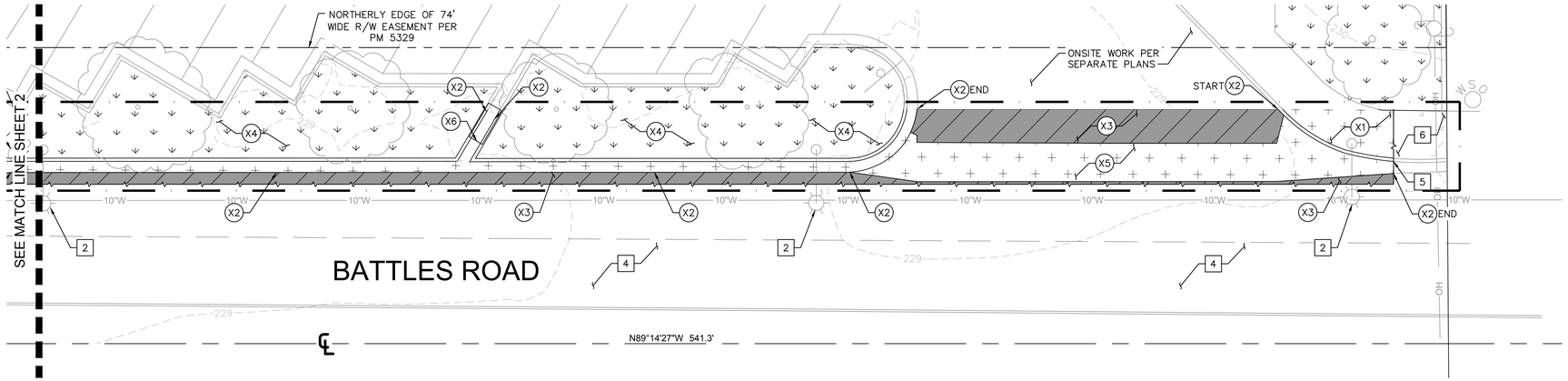
CITY OF SANTA MARIA
DEPARTMENT OF PUBLIC WORKS

SCALE | DATE | APPROVED:

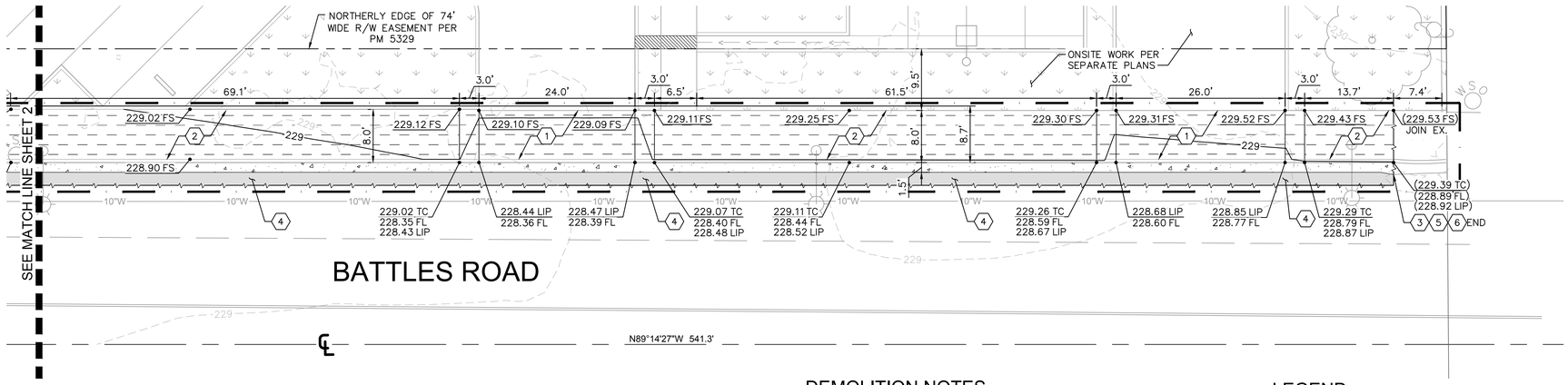
BATTLES ROAD STREET IMPROVEMENTS

DRAWN BY:	IV
CHECKED BY:	AZ
DATE:	3/18/2025
SHEET	2 OF 4 SHEETS
REFERENCES:	
FILE NO.	

DEMOLITION PLAN



IMPROVEMENT PLAN



DEMOLITION NOTES

- (X1) REMOVE EXISTING CONCRETE SIDEWALK AND BASE COURSE INCLUDING REBAR
- (X2) REMOVE AND PROPERLY DISPOSE OF EXISTING CURB AND GUTTER
- (X3) REMOVE AND PROPERLY DISPOSE OF EXISTING ASPHALT CONCRETE PAVEMENT AND BASE COURSE
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- (X6) REMOVE EXISTING DIAMOND PLATE
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- [1] PROTECT–IN–PLACE EXISTING WATER VALVE
- [2] PROTECT–IN–PLACE EXISTING LIGHT POLE. CONTRACTOR TO RAISE TO FINAL GRADE.
- [3] PROTECT–IN–PLACE EXISTING WATER STRUCTURE
- [4] PROTECT–IN–PLACE EXISTING ASPHALT CONCRETE PAVEMENT
- [5] PROTECT–IN–PLACE EXISTING CURB AND GUTTER
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CONSTRUCTION NOTES

- ⟨1⟩ CONSTRUCT DRIVEWAY PER CITY OF SANTA MARIA STD. DWG. RD–12A
- ⟨2⟩ CONSTRUCT SIDEWALK PER CITY OF SANTA MARIA STD. DWG. RD–11
- ⟨3⟩ CONSTRUCT CURB AND GUTTER PER CITY OF SANTA MARIA STD. DWG. RD–11
- ⟨4⟩ PROPOSED ASPHALT PAVEMENT PER CITY OF SANTA MARIA STD. DWG. RD–21
- ⟨5⟩ JOIN EXISTING CONCRETE CURB AND GUTTER
- ⟨6⟩ SAWCUT EXISTING CONCRETE CURB AND GUTTER

LEGEND

- PROPERTY LINE
- LOT LINE
- EXISTING EASEMENT
- CENTERLINE
- LIMIT OF WORK LINE
- SAWCUT LINE
- EXISTING ASPHALT CONCRETE PAVEMENT TO BE REMOVED
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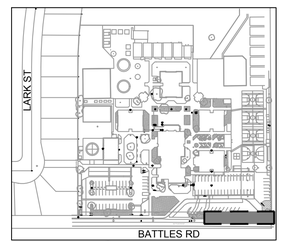
- EXISTING CONCRETE PAVEMENT AND BASE COURSE INCLUDING REBAR TO BE REMOVED
- EXISTING LANDSCAPE AREA
- EXISTING CONCRETE PAVEMENT
- STANDARD DUTY CONCRETE PAVEMENT
- HEAVY DUTY ASPHALT CONCRETE PAVEMENT

NORTH

GRAPHIC SCALE IN FEET
0 5 10 20

SCALE 1" = 10'
WHEN PRINTED FULL SIZE
24" X 36"



KEYMAP
SCALE 1"=200'

EXISTING UTILITY NOTE

THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST POTHOLE AND FIELD VERIFY THE LOCATION AND DEPTH OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO CIVIL ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.

811 Know what's below. Call 811 before you dig.

REGISTERED PROFESSIONAL ENGINEER
AHMED ZUWAWA
RCE NO. 92059
CIVIL
STATE OF CALIFORNIA

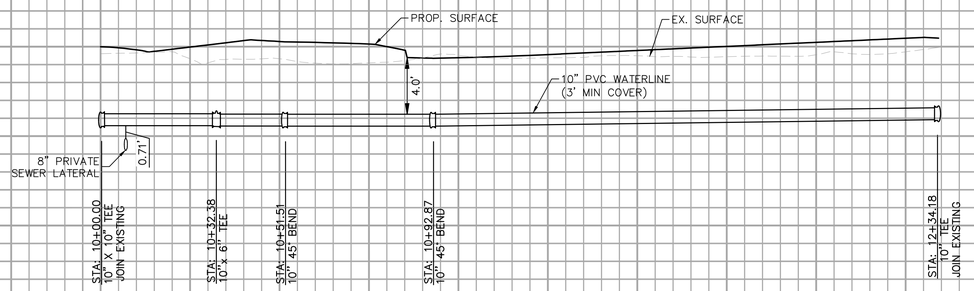
REVISIONS				
REV.	BY	ITEM	APPROVED	DATE
0	AZ	ISSUE FOR PERMIT		

CITY OF SANTA MARIA
DEPARTMENT OF PUBLIC WORKS

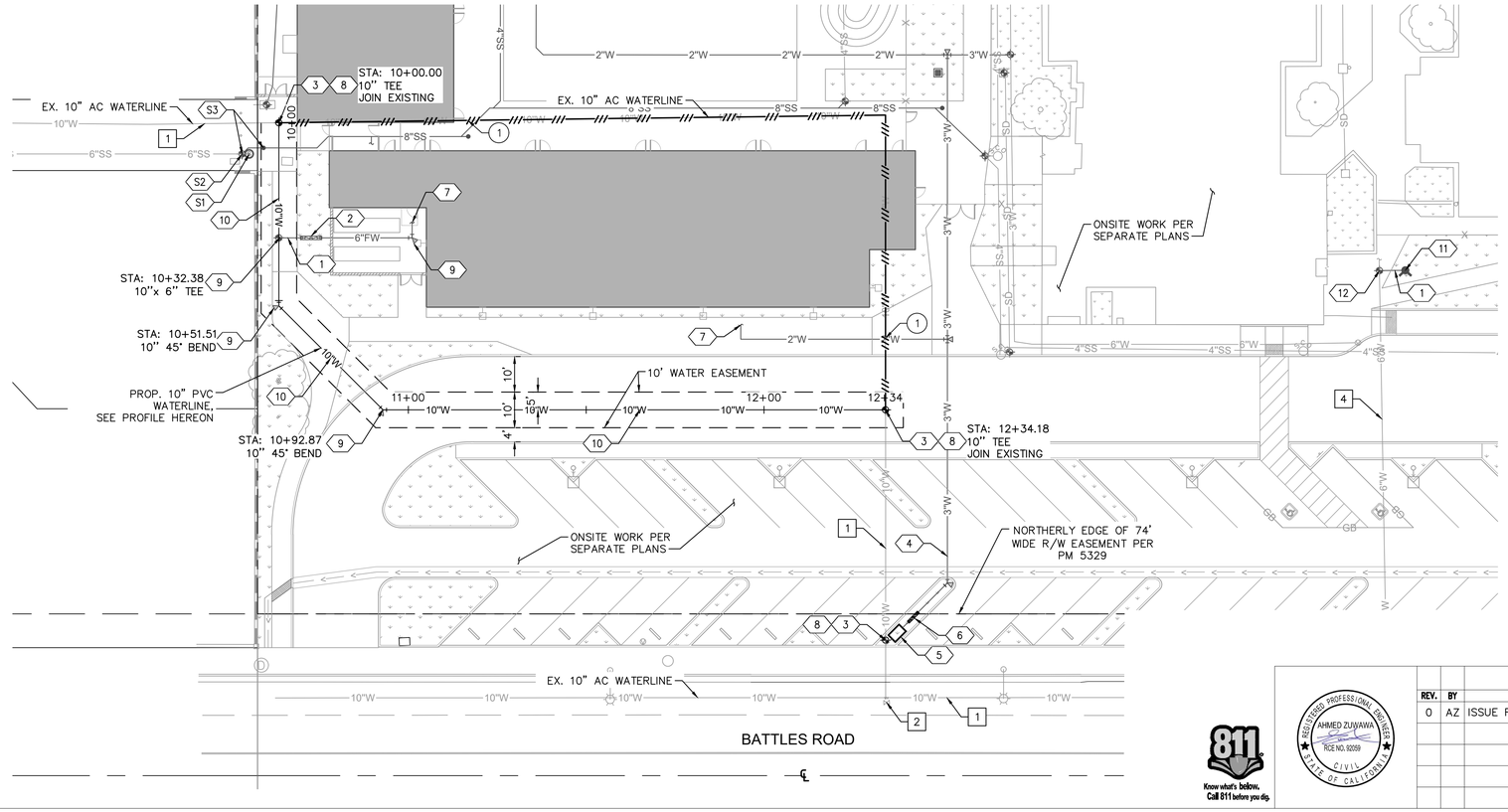
SCALE | DATE | APPROVED:

BATTLES ROAD STREET IMPROVEMENTS

DRAWN BY:	IV
CHECKED BY:	AZ
DATE:	3/18/2025
SHEET	3 OF 4 SHEETS
REFERENCES:	
FILE NO.	



PROP. 10" PVC WATERLINE PROFILE



DOMESTIC WATER NOTES

1. INSTALL 6" PVC FIRE WATER LINE PER CITY OF SANTA MARIA STD. DWG. WA-18B. TRENCH PER CITY OF SANTA MARIA STD. DWG. RD3-33
2. INSTALL 6" BACKFLOW DEVICE PER CITY OF SANTA MARIA STD. DWG. WA-27F
3. HOT TAP EXISTING 10" WATER LINE PER CITY OF SANTA MARIA STD. DWG. WA-18B. CONTRACTOR TO COORDINATE CONNECTION WITH CITY INSPECTOR.
4. INSTALL 3" PVC DOMESTIC WATER LINE PER CITY OF SANTA MARIA STD. DWG. WA-18B. TRENCH PER CITY OF SANTA MARIA STD. DWG. RD3-33
5. INSTALL SALVAGED EXISTING CAMPUS DOMESTIC WATER METER
6. INSTALL 3" BACKFLOW DEVICE PER CITY OF SANTA MARIA STD. DWG. WA-29
7. BUILDING WATER POINT OF CONNECTION (5-FT FROM BUILDING FACE)
8. CONNECT TO EXISTING 10" WATER MAIN LINE
9. INSTALL THRUST BLOCK
10. INSTALL 10" PVC DOMESTIC WATER LINE PER CITY OF SANTA MARIA STD. DWG. WA-18B. TRENCH PER CITY OF SANTA MARIA STD. DWG. RD3-33
11. INSTALL FIRE HYDRANT AND CHECK VALVE PER CITY OF SANTA MARIA STD. DWG. WA-31.
12. HOT TAP EXISTING 6" WATER LINE PER CITY OF SANTA MARIA STD. DWG. WA-18B. CONTRACTOR TO COORDINATE CONNECTION WITH CITY INSPECTOR.

SANITARY SEWER NOTES

- S1 INSTALL SANITARY SEWER MANHOLE PER CITY OF SANTA MARIA STD. DWG. SS-10D. TRENCH PER CITY OF SANTA MARIA STD. DWG. RD3-33
- S2 CONNECT TO EXISTING 6" LINE PER CITY OF SANTA MARIA STD. DWG. SS-14B
- S3 INSTALL 6" SDR-35 PVC PRIVATE SANITARY SEWER LINE PER SEPARATE ONSITE PLANS FROM CLEANOUT AT PROPERTY LINE TO WYE CONNECTION TO PUBLIC MAIN

EXISTING UTILITY NOTE

THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST POTHOLE AND FIELD VERIFY THE LOCATION AND DEPTH OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO CIVIL ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.

LEGEND

- PROPERTY LINE
- LOT LINE
- EXISTING EASEMENT
- CENTERLINE
- UTILITY TO BE REMOVED
- 6"FW — PROPOSED FIRE WATER LINE
- 10"W — PROPOSED 10" WATER MAIN LINE
- 10"W — EXISTING 10" WATER MAIN LINE
- CONNECTION TO EXISTING UTILITY

PROTECTION NOTES

1. PROTECT-IN-PLACE EXISTING 10" WATER MAIN LINE
2. PROTECT-IN-PLACE EXISTING WATER VALVE
3. PROTECT-IN-PLACE EXISTING WATER STRUCTURE
4. PROTECT-IN-PLACE EXISTING6" WATER LINE

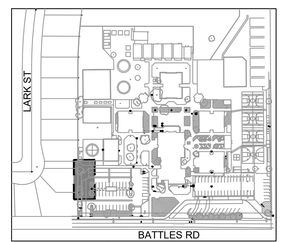
DEMOLITION NOTES

1. REMOVE EXISTING 10" WATER LINE MAIN

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

SCALE 1" = 20'
WHEN PRINTED FULL SIZE
24" X 36"



KEYMAP
SCALE 1"=200'

Know what's below. Call 811 before you dig.

REGISTERED PROFESSIONAL ENGINEER
AHMED ZUWAWA
RCE NO. 92559
CIVIL
STATE OF CALIFORNIA

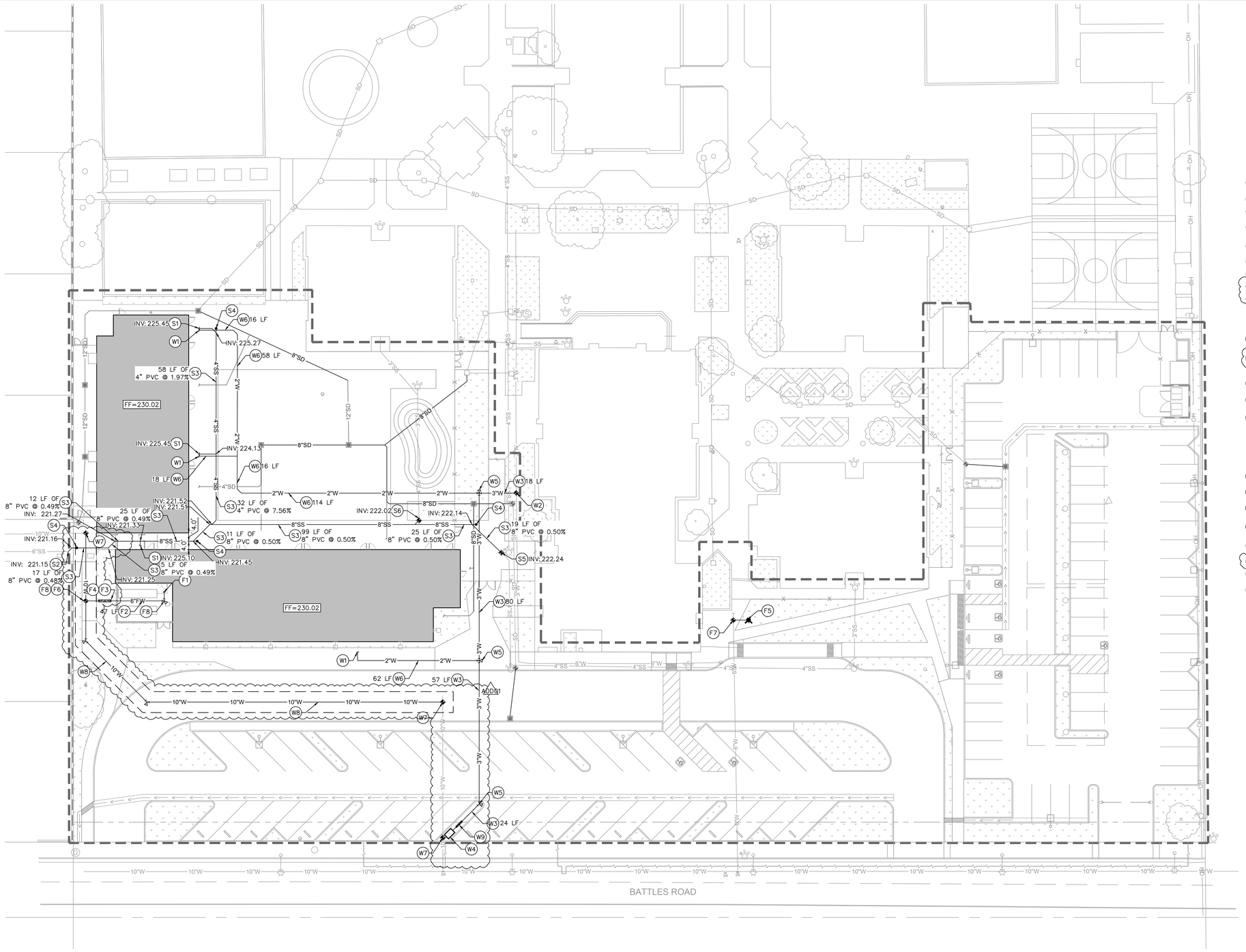
REVISIONS					
REV.	BY	ITEM	APPROVED	DATE
0	AZ	ISSUE FOR PERMIT		

CITY OF SANTA MARIA
DEPARTMENT OF PUBLIC WORKS

SCALE | DATE | APPROVED:

WATER IMPROVEMENT PLAN

DRAWN BY:	IV
CHECKED BY:	AZ
DATE:	3/27/2025
SHEET	4 OF 4 SHEETS
REFERENCES:	
FILE NO.	



LEGEND

- PROPERTY LINE
- LOT LINE
- CIVIL LIMIT OF WORK LINE
- W — PROPOSED WATER LINE
- SS — PROPOSED SEWER LINE
- SD — PROPOSED STORM DRAIN LINE
- FW — PROPOSED FIRE WATER LINE
- PROPOSED LANDSCAPE AREA

DOMESTIC WATER

- (W1) BUILDING POINT OF CONNECTION (5-FT FROM BUILDING FACE). REFER TO PLUMBING PLAN FOR CONTINUATION
- (W2) POINT OF CONNECTION TO EXISTING 3" WATER MAIN
- (W3) INSTALL 3" SCHEDULE 40 PVC C900 WATER LINE. TRENCHING PER DETAIL 9, SHEET C6.0.
- (W4) COORDINATE RELOCATION OF EXISTING WATER METER WITH LOCAL WATER PURVEYOR PER SEPARATE PERMIT.
- (W5) INSTALL PVC C900, CLASS 200, BEND WITH THRUST BLOCK. SIZE PER PLAN. ANGLE PER PLAN. SEE DETAIL 1, SHEET C6.1.
- (W6) INSTALL 2" SCHEDULE 40 PVC WATER LINE. TRENCHING DETAIL 9, SHEET C6.0.
- (W7) CONNECT TO EXISTING 10" WATER LINE PER SEPARATE PERMIT. ADD#1
- (W8) INSTALL 10" SCHEDULE 40 PVC WATER LINE PER SEPARATE PERMIT.
- (W9) INSTALL BACKFLOW PREVENTER PER SEPARATE PERMIT.

SANITARY SEWER

- (S1) BUILDING POINT OF CONNECTION (5-FT FROM BUILDING FACE). REFER TO PLUMBING PLAN FOR CONTINUATION ADD#1
- (S2) PROPOSED WYE CONNECTION TO EXISTING SEWER MAIN PER SEPARATE PERMIT. INSTALL 8"X6" FITTING ON PRIVATE LATERAL UPSTREAM OF CLEANOUT AND WYE CONNECTION.
- (S3) INSTALL SDR-35 PVC SANITARY SEWER LATERAL. SIZE PER PLAN. TRENCHING PER DETAIL 9, SHEET C6.0.
- (S4) INSTALL SANITARY SEWER CLEANOUT PER DETAIL 2, SHEET C6.1.
- (S5) POINT OF CONNECTION TO EXISTING 4" SANITARY SEWER LATERAL. CONTRACTOR TO POTHOLE AND VERIFY DEPTH OF LINE PRIOR TO THE START OF CONSTRUCTION. NOTIFY CIVIL ENGINEER OF ANY DISCREPANCIES.

FIRE WATER

- (F1) BUILDING POINT OF CONNECTION (5-FT FROM BUILDING FACE). REFER TO FIRE PROTECTION PLANS PLANS FOR CONTINUATION
- (F2) INSTALL 6" PVC C900 FIRE WATER LINE. TRENCH PER DETAIL 9, SHEET C6.0.
- (F3) INSTALL 6" FEBCO MASTERSERIES LF876V BACKFLOW PREVENTER PER DETAIL 10, SHEET C6.0, OR APPROVED EQUAL.
- (F4) INSTALL FIRE DEPARTMENT CONNECTION PER DETAIL 7, SHEET C6.1. MOUNT TO BACKFLOW PREVENTER
- (F5) INSTALL FIRE HYDRANT PER CITY OF SANTA MARIA STANDARD DRAWING WA-31, SHOWN IN DETAIL 4, SHEET C6.1, PER SEPARATE PERMIT.
- (F6) CONNECT TO 10" WATER LINE PER SEPARATE PERMIT. ADD#1
- (F7) POINT OF CONNECTION TO EXISTING 6" WATER LINE LATERAL PER SEPARATE PERMIT.
- (F8) INSTALL PVC C900, CLASS 200, BEND WITH THRUST BLOCK. SIZE PER PLAN. ANGLE PER PLAN. SEE DETAIL 1, SHEET C6.1.

EXISTING UTILITY NOTE

THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST POTHOLE AND FIELD VERIFY THE LOCATION AND DEPTH OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO CIVIL ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.

GENERAL NOTE

CONTRACTOR SHALL CONSTRUCT GRAVITY UTILITIES (SEWER) BEFORE OTHER UTILITIES. CONSTRUCTION OF THESE GRAVITY UTILITIES TO START FROM THE DOWNSTREAM ENDS AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

SCALE 1" = 20'
WHEN PRINTED FULL SIZE
30" X 42"

CALIFORNIA PROFESSIONAL ENGINEER
Ahmed Zuwawa
RCE NO. 92259
CIVIL
STATE OF CALIFORNIA

DLRGROUP

BATTLES BEARS

BATTLES ES - TK/K BUILDING

Santa Maria-Bonita School District

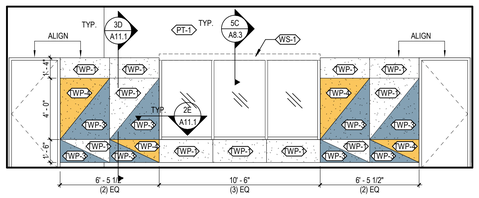
605 E Battles Rd, Santa Maria, CA 93454

CONSTRUCTION DOCUMENTS
12/16/2024
REVISIONS
3/17/2025 ADD#1

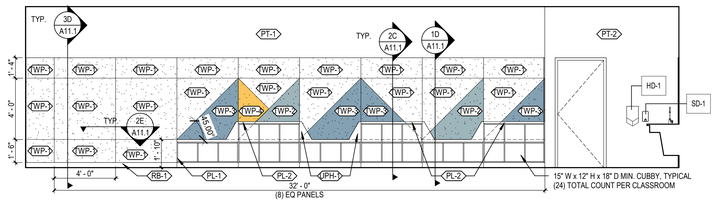
DSA App: 03-124614
DSA File No: 42-48
75-24119-00

UTILITY PLAN

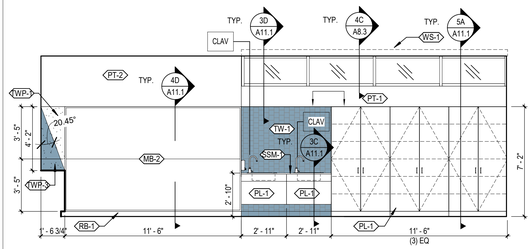
C5.0



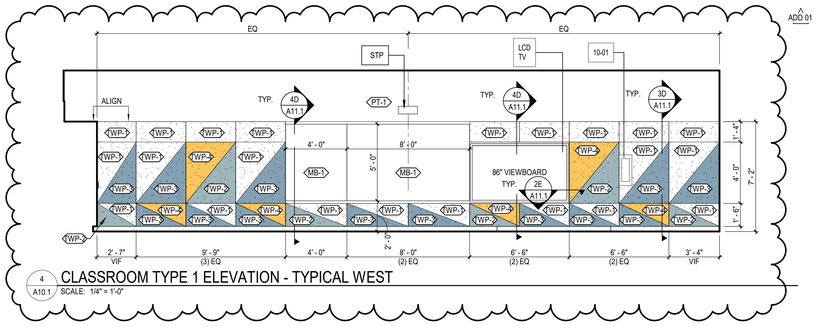
1 A10.1 CLASSROOM TYPE 1 ELEVATION - TYPICAL NORTH
SCALE: 1/4" = 1'-0"



2 A10.1 CLASSROOM TYPE 1 ELEVATION - TYPICAL EAST
SCALE: 1/4" = 1'-0"



3 A10.1 CLASSROOM TYPE 1 ELEVATION - TYPICAL SOUTH
SCALE: 1/4" = 1'-0"



4 A10.1 CLASSROOM TYPE 1 ELEVATION - TYPICAL WEST
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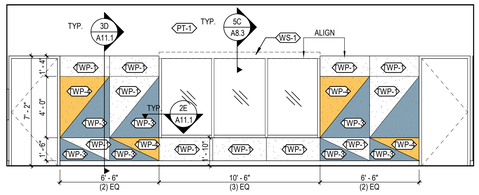
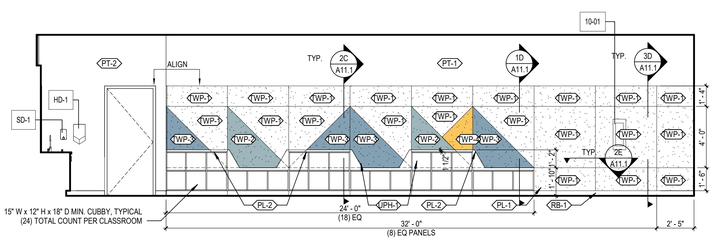
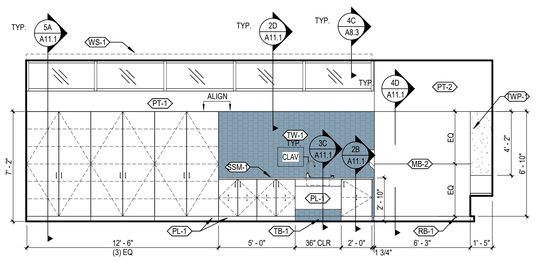


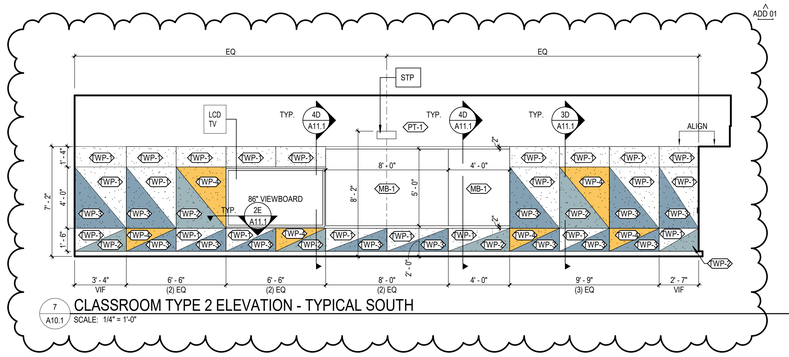
5 A10.1 CLASSROOM TYPE 2 ELEVATION - TYPICAL EAST
SCALE: 1/4" = 1'-0"



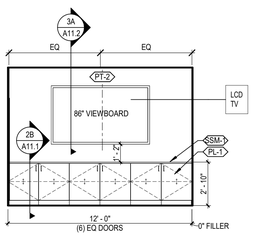
6 A10.1 CLASSROOM TYPE 2 ELEVATION - TYPICAL NORTH
SCALE: 1/4" = 1'-0"



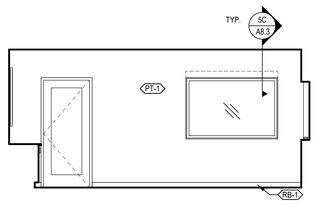
8 A10.1 CLASSROOM TYPE 2 ELEVATION - TYPICAL WEST
SCALE: 1/4" = 1'-0"



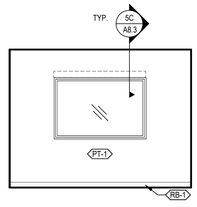
7 A10.1 CLASSROOM TYPE 2 ELEVATION - TYPICAL SOUTH
SCALE: 1/4" = 1'-0"



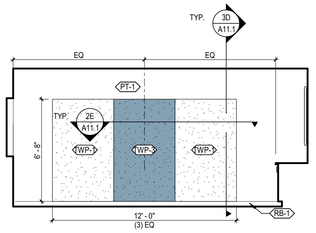
17 A10.1 CONFERENCE ROOM ELEVATION - NORTH
SCALE: 1/4" = 1'-0"



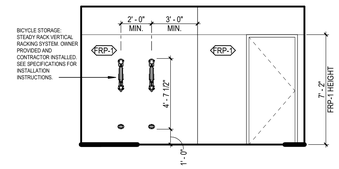
18 A10.1 CONFERENCE ROOM ELEVATION - EAST
SCALE: 1/4" = 1'-0"



19 A10.1 CONFERENCE ROOM ELEVATION - SOUTH
SCALE: 1/4" = 1'-0"



20 A10.1 CONFERENCE ROOM ELEVATION - WEST
SCALE: 1/4" = 1'-0"



9 A10.1 STORAGE & CUSTODIAL ELEVATION - WEST
SCALE: 1/4" = 1'-0"

CASEWORK AND MILLWORK GENERAL NOTES

A. CASEWORK AND MILLWORK GENERAL NOTES APPLY TO ALL CASEWORK/MILLWORK SHEETS.
B. ELEVATIONS DENOTED AS MILLWORK ARE SPECIFIED UNDER DIVISION 06. ALL OTHERS SHALL BE SPECIFIED UNDER DIVISION 12, UNLESS NOTED OTHERWISE.
C. ALL BASE CABINETS TO BE 2'-0" DEEP UNITS, UNLESS NOTED OTHERWISE.
D. ALL UPPER WALL CABINETS TO BE 1'-2" DEEP UNITS, UNLESS NOTED OTHERWISE.
E. ALL TALL STORAGE CABINETS TO BE 2'-0" DEEP UNITS, UNLESS NOTED OTHERWISE.
F. ALL SHELVING IN CASEWORK TO BE ADJUSTABLE SHELVING, UNLESS NOTED OTHERWISE.
G. CATALOG NUMBERS SHOWN ON THE ELEVATIONS FOR CASEWORK ARE XXXXX MANUFACTURER, UNLESS NOTED OTHERWISE. (M) AFTER THE CATALOG NUMBER INDICATES THE CABINET IS SHOWN MODIFIED FROM THE MANUFACTURER'S STANDARD.
H. WHERE PLUMBING OR ELECTRICAL DEVICES ARE LOCATED IN CASEWORK, CASEWORK CONTRACTOR SHALL PROVIDE OPENINGS. COORDINATE LOCATION AND QUANTITY WITH THE PLUMBING OR ELECTRICAL CONTRACTOR.
I. PROVIDE SEALANT AT ALL PERIMETER JOINTS WHERE COUNTERTOPS, BACK AND SIDE SPLASHES, CASEWORK AND MILLWORK ABUT WALLS.
J. FIELD VERIFY ALL DIMENSIONS OF CABINET LOCATIONS IN THE BUILDING PRIOR TO FABRICATION.
K. PROVIDE LOCKS WHERE INDICATED AT DOORS AND DRAWERS.
L. PROVIDE COLOR MATCHING SILICON EDGEBANDING & FINISHED ENDS AT ALL EXPOSED ENDS OF CASEWORK AND MILLWORK.
M. ALL EXPOSED SURFACES IN OPEN SHELVING SHALL BE PLASTIC LAMINATE COVERED.
N. SEE DETAIL 1C/A11.1 FOR TYPICAL COUNTERTOP DETAIL.
O. GYP BOARD CONTROL JOINTS TO BE INSTALLED PER 09 21 16.

REFERENCE KEYNOTES

ADD 01

10-01	RECESSED FIRE EXTINGUISHER, PER 1A/A11.2
CLAV	CLASSROOM LAVATORY
HD-1	HAND DRYER - WARM AIR
LCD TV	
SD-1	SOAP DISPENSER - SURFACE MOUNTED
LCD TV	VIEWBOARD AND MOUNT. APPROX 75" FROM FLOOR TO TOP OF BACKING FOR FLAT PANEL MOUNT. FLAT PANEL SCREEN TO BE OFCI, VERIFY LOCATION WITH DISTRICT AND ARCH.
STP	SHORT THROW PROJECTOR AND MOUNT. APPROX 98" FROM FLOOR TO TOP OF PROJECTOR MOUNT. SHORT THROW PROJECTOR AND MOUNT TO BE OFCI. VERIFY LOCATION WITH DISTRICT AND ARCH.
A	ALL CLASSROOMS TO HAVE A OFCI WALL MOUNTED SHORT THROW PROJECTOR & MOUNT, FLAT PANEL MONITOR & MOUNT, AND WHITEBOARD BALANCE PANEL WITH FLATNESS COMPATIBILITY TO PROJECTOR LOCATED UNDER PROJECTOR. PROVIDE BACKING FOR ALL EQUIPMENT PER 21/06.21.

DLRGROUP
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BATTLES ES - TK/K BUILDING
Santa Maria-Bonita School District
605 E Battles Rd, Santa Maria, CA 93454

CONSTRUCTION DOCUMENTS
12/16/2024
REVISIONS
ADD 01 2/5/2025 ADDENDUM 01

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

INTERIOR ELEVATIONS

A10.1

INTERIOR FINISH SCHEDULE

SOUND ABSORBING WALL UNITS

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
TWP-1	TACKABLE FABRIC WRAPPED ACOUSTIC PANEL (GREY)	AVL SYSTEMS	CUSTOM FABRIC WRAPPED ACOUSTECH HIGH IMPACT TACKABLE ACOUSTIC PANEL 7/8" THICK.	FABRIC: MAHARAM, MERIT, 466444-001 TRICKLE	SEE ELEVATIONS	C-7 PCF FIBERGLASS SUBSTRATE WITH 1/8" 16-20 PCF HIGH DENSITY FIBERGLASS TACKABLE LAYER. EXPOSED EDGE TO RECEIVE TRIM TR-2, OR HARDENED EDGES PER MANUFACTURER.	PANEL: COBY BOTHA E: COBYBOTHA@MYPACIFICSOLUTION.COM P: 949.280.4137 FABRIC: LINDSAY AVERY E: LAVERY@MAHARAM.COM P: 213.392.2913	CLASSROOMS, CONFERENCE
TWP-2	TACKABLE FABRIC WRAPPED ACOUSTIC PANEL (LIGHT BLUE)	AVL SYSTEMS	CUSTOM FABRIC WRAPPED ACOUSTECH HIGH IMPACT TACKABLE ACOUSTIC PANEL 7/8" THICK.	FABRIC: MAHARAM, MERIT, 466444-014 RIPPLE	SEE ELEVATIONS			
TWP-3	TACKABLE FABRIC WRAPPED ACOUSTIC PANEL (BLUE)	AVL SYSTEMS	CUSTOM FABRIC WRAPPED ACOUSTECH HIGH IMPACT TACKABLE ACOUSTIC PANEL 7/8" THICK.	FABRIC: MAHARAM, MERIT, 466444-011 POOLSIDE	SEE ELEVATIONS			
TWP-4	TACKABLE FABRIC WRAPPED ACOUSTIC PANEL (YELLOW)	AVL SYSTEMS	CUSTOM FABRIC WRAPPED ACOUSTECH HIGH IMPACT TACKABLE ACOUSTIC PANEL 7/8" THICK.	FABRIC: MAHARAM, MODE, 466337-015 GOLDENROD	SEE ELEVATIONS			
UPH-1	UPHOSTERLY FABRIC (BLUE)	MAHARAM FABRICS	MERIT	466444-011 POOLSIDE	SEE ELEVATIONS	FOR BENCH CUSHIONED SEATING, SEE DETAIL 1D/A11.1	LINDSAY AVERY E: LAVERY@MAHARAM.COM P: 213.392.2913	CLASSROOMS

CARPET

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
WM-1	WALK-OFF MAT	MOHAWK GROUP	FIRST STEP II	955 COBALT	24" X 24"	MONOLITHIC INSTALLATION, W/ ECO-BACKING. WM-1 TO BE OFCI (ADD 01)	ANDREW JOHNSON E: ANDREW_JOHNSON1@MOHAWKIND.COM P: 310.936.0369	TYP. WALK-OFF MAT FOR ALL ROOMS WITH EXTERIOR DOOR AND AT CLASSROOM SINKS
CPT-1	CARPET FLOORING	MOHAWK GROUP	SIDE STRIPE GT419	965 WESTPOINT	24" X 24"	BRICK INSTALLATION. W/ ECO-BACKING. CPT-1 TO BE OFCI (ADD 01)		CLASSROOMS, CONFERENCE

CONCRETE FINISHING

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
SC-1	SEALED CONCRETE	ASHFORD FORMULA				CLEAR SEALER, PREMIUM QUALITY, LOW VOC	BRUCE SILVERS E: BRUCE@BMSAINC.COM P: 949.233.2127	TYPICAL THROUGHOUT

CORNER GUARDS

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
CGD-1	CORNER GUARD	FRY RECGLET	DRYWALL CORNER TRIM DMCT-375	1001 GLOBAL WHITE	3/8"	SEE DETAIL 2A/A11.1	MARVIN ROSSATTY E: MARVINROSSATTY@FRYREGLET.COM P: 626.394.8641	TYPICAL THROUGHOUT

CUSTOM MILLWORK

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
PL-1	PLASTIC LAMINATE (WOOD)	ABET LAMINATI	ABET COLLECTION LAMINATES	639 GRAINWOOD	51" X 120"	VERTICLE GRAIN DIRECTION, MATTE. PROVIDE 1/4" COLOR MATCHING SILICONE EDGEBANDING FOR ALL EXPOSED EDGES ON MILLWORK.	JOE DANNA E: JOE.DANNA@ABETLAMINATI.COM P: 714.504.1328	TYPICAL THROUGHOUT
PL-2	PLASTIC LAMINATE (ACCENT)	ABET LAMINATI	ABET COLLECTION LAMINATES	853 BLEU SPAZIO	51" X 120"	PROVIDE 1/4" COLOR MATCHING SILICONE EDGEBANDING FOR ALL EXPOSED EDGES ON MILLWORK.		
HW-02	CABINET PULL	MOCKETT	#DP130A, 6 25/32" - SATIN STAINLESS STEEL			SEE A-SERIES SHEETS FOR MILLWORK HARDWARE LOCATION		
HW-03	DRAWER GLIDES-	HAFELE	FULL EXTENSION HEAVY DUTY SIDE MOUNT DRAWER GLIDES ACCURIDE-3832-22, ZINC...					
HW-04	CONCEALED HINGES-	HAFELE	165 DEGREE CONCEALED HINGE			PROVIDE 90 DEGREE CONCEALED HINGE WHERE ADJACENT TO WALL		
HW-05	SHELF SUPPORTS	HAFELE	1/4" DIA., ANGLE 282.11.761, NICKEL PLATED. PROVIDE (4) MIN. PER SHELF					
HW-06	CABINET LOCK	HAFELE	CAM LOCKS, NATIONAL LOCK C8053-14A					

INFORMATION SPECIALTIES

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
MB-1	MARKERBOARD	EGAN	DIMENSION HOVER	PORCELAIN WHITE	4' X 8' SEE ELEVATIONS	Z-CLIP MOUNTING, WHITE TRIM, MAGNETIC	TERRI BURKHART E: terri@epictrends.net P: 760.717.7167	CLASSROOMS, CONFERENCE
MB-2	MAGNETIC MARKERBOARD WALLCOVERING	KOROSEAL	WALLTALKERS W/ MAGNETIC TRAY	MAG-RITE 48 WHITE M248-00	48"W x 75'ROLL, SEE ELEVATIONS FOR INSTALL DIMENSION	INSTALLED HORIZONTALLY TO AVOID SEAMS IN THE MAIN WRITING AND PROJECTION AREA, PREP WALL TO BE LEVEL 4 PRIOR TO INSTALL WALLCOVERING.	LAURA POITRAS E: LPOITRAS@KOROSEAL.COM P: 213.505.6544	CLASSROOMS, CONFERENCE

METAL TRIM

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
MTB-1	METAL BASE, COVE	SCHLUTER	DILEX- AHK 1S125 AT	SATIN ANODIZED	REQUIRED TO COORDINATE WITH TILE SELECTION AND SETTING SYSTE...	REFER TO DETAIL 5E/A11.1	MARY E. YOCUM E: MYOCUM@SCHLUTER.COM P: 714.329.0355	TYP THROUGHOUT RESTROOMS
MTB-2	METAL BASE, CORNER COVE	SCHLUTER	DILEX- AHK 1S125 AT, IN CORNER 90-DEGREE	SATIN ANODIZED	REQUIRED TO COORDINATE WITH TILE SELECTION AND SETTING SYSTE...	REFER TO DETAIL 4E/A11.1		TYP THROUGHOUT RESTROOMS
TR-1	EDGE TRIM	SCHLUTER	QUADEC ALUMINUM EDGE STRIP	SATIN ANODIZED	MATCH DEPTH OF TILE	REFER TO DETAIL 4E/A11.1, WHERE APPLICABLE		AT ACOUSTIC WALL PANEL & WALLCOVERINGS W/ SUBSTRATE
TR-2	EDGE TRIM	SCHLUTER	AE250 STRAIGHT ANCHORING LEG SCHIENE STRAIGHT	SATIN ANODIZED	1" OR AS REQUIRED TO COORDINATE WITH SPECIFIED FINISH	REFER TO ELEVATIONS AND DETAILS FOR LOCATION		AT ACOUSTIC WALL PANEL & WALLCOVERINGS W/ SUBSTRATE

ACOUSTIC CEILING PANELS

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
ACT-1	ACOUSTIC CEILING TILE & GRID	ARMSTRONG	GRID: SUPRAFINE XL 9/16" EXPOSED TEE, TILE: PUEBLO TEGULAR LAY-IN 9/16"	WHITE	24" X 48"		MATTHEW P. NEWMAN E: MPNEWMAN@ARMSTRONGCEILINGS.COM P: 213.408.9957	CLASSROOMS, CONFERENCE

PAINTING

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
PT-1	FIELD PAINT	SHERWIN-WILLIAMS		SW7004 SNOWBOUND		SEMI-GLOSS FOR WALL, SEMI-GLOSS FOR DOOR AND DOOR FRAME, FLAT FOR CEILING, U.O.N.	TOM BRUMMETT E: THOMAS.W.BRUMMETT@SHERWIN.COM P: 310.999.9396	GENERAL PAINT
PT-2	ACCENT PAINT (ACCENT BLUE)	SHERWIN-WILLIAMS		SW6793 BLUEBELL				ACCENT PAINT. REFER TO FINISH PLAN
PT-3	ACCENT PAINT (LIGHT BLUE)	SHERWIN-WILLIAMS		SW6778 AVIARY BLUE				ACCENT PAINT. REFER TO EXTERIOR ELEVATIONS
PT-4	ACCENT PAINT (MEDIUM BLUE)	SHERWIN-WILLIAMS		SW6500 OPEN SEAS				ACCENT PAINT. REFER TO EXTERIOR ELEVATIONS
PT-5	ACCENT PAINT (DARK BLUE)	SHERWIN-WILLIAMS		SW7602 INDIGO BATIK				ACCENT PAINT. REFER TO EXTERIOR ELEVATIONS
PT-6	ACCENT PAINT (GREY)	SHERWIN-WILLIAMS		SW7057 SILVER STRAND				INTERIOR DOOR AND DOOR FRAME

SOLID SURFACE

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
SSM-1	QUARTZ SOLID SURFACE	FORMICA	EVERFORM SOLID SURFACE	LUNA SAND			BILL YOUNT E: BILL.YOUNT@FORMICA.COM P: 310.266.2861	CLASSROOMS

RUBBER ACCESSORIES

TAG	MATERIAL	MANUFACTURER	MODEL	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
RB-1	RESILIENT BASE	ROPPE	VINYL WALL BASE 1/8"	174 SMOKE	4" H			

TILING

TAG	MATERIAL	MANUFACTURER	COLLECTION	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
TB-1	TILE - BASE	TILE BAR	PEZZI SPECIALI - I COLORI	MARINA & GALASSIA	8"X4"X5/16"	MONOLITHIC INSTALLATION, 1/16" GROUT LINE, GROUT COLOR: GREY, FULL MORTAR SET FLOOR TILE, 50% EACH (2-TONE) AT INDICATED WALLS	AMY KNECHT E: AKNECHT@TILEBAR.COM P: 570.927.5474	CLASSROOMS
TW-1	TILE - WALL (ACCENT)	TILE BAR - CE SI...	I COLORI	MARINA & GALASSIA	4"X4"X5/16"	1/16" GROUT LINE, GROUT COLOR: GREY, THINSET WALL TILE FULL HEIGHT, SUBSTRATE SHALL BE DENSHIELD OR OTHER DURABLE PRODUCT, NO PLYWOOD BACKING REQUIRED, 50% EACH (2-TONE) AT INDICATED WALLS, VERTICAL BRICK...		STAFF RESTROOMS, KINDER RESTROOMS
TW-2	TILE - WALL (WHITE)	TILE BAR - CE SI...	I COLORI	TALCO	4"X4"X5/16"	1/16" GROUT LINE, GROUT COLOR: GREY, THINSET WALL TILE FULL HEIGHT, SUBSTRATE SHALL BE DENSHIELD OR OTHER DURABLE PRODUCT, NO PLYWOOD BACKING REQUIRED, 100% AT ALL WALLS, MONOLITHIC INSTALLATION		
TF-1	TILE - FLOOR	TILE BAR	FORDHAM	GRIGIO MATTE PORCELAIN	12"X24"X5/16"	MONOLITHIC INSTALLATION, 1/16" GROUT LINE, GROUT COLOR: GREY, FULL MORTAR SET FLOOR TILE		
THRESHO...	ENGINEERED STONE THRESHOLD	TILE BAR	ENGINEERED STONE SADDLE	WHITE POLISHED	6" x 36" x 3/4"	SEE DETAIL 51/A1.1104		

PLASTIC PANELING

TAG	MATERIAL	MANUFACTURER	COLLECTION	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
FRP-1	FIBER REINFORCED PLASTIC	MARLITE	SMOOTH	S 100G WHITE	4'W x 7'-2"H	INSTALL TO ALIGN WITH DOOR FRAME	ASHLEY BARKHEIMER E: ABARKHEIMER@MARLITE.COM P: N/A	CUSTODIAL
TC-1	TOILET COMPARTMENT	SPECIAL-LITE	SPECLITE 3 FRP	LIGHT GREY	SEE ELEVATION		DENNIS ZANROSSO E: DENNISZ@THEZGROUP.COM P: 848.340.1011	RESTROOMS

WINDOW TREATMENT

TAG	MATERIAL	MANUFACTURER	COLLECTION	FINISH OR COLOR	SIZE	COMMENTS	REP CONTACT	LOCATION
WS-1	WINDOW TREATMENT/ SOLAR	MECHOSHADE	MANUALLY OPPERATED ROLLER SHADES	SOLAR: THERMOVEIL DENSE BASKET WEAVE1500 SERIES (3% OPEN), COLOR: 1519 SILVER BIRCH	VARIES	MOUNTING METHOD: WALL - MOUNTED FASCIA: WHITE BRACKET: MECHO/7, SINGLE ROLLER SHADES, PROVIDE MULTIBAND SHADES AT ALL LOCATIONS FOR OPERATION OF ALL BANDS SIMULTANEOUSLY USING A SINGLE CLUTCH OPERATOR (ADD 01)	JESSE RUSS E: JESSE@ARCHITYPE.NET P: 213.631.5001	THROUGHOUT AT PERIMETER WINDOWS
WS-2	WINDOW TREATMENT/ SOLAR	MECHOSHADE	ELECTRONICALLY OPERATED ROLLER SHADES, SEE ELECTRICAL SHEETS.	SOLAR: THERMOVEIL DENSE BASKET WEAVE1500 SERIES (3% OPEN), COLOR: 1519 SILVER BIRCH	VARIES	MOUNTING METHOD: WALL - MOUNTED FASCIA: WHITE BRACKET: ELECTRO/2 BRACKET MOTOR: WHISPER 92/+ AC SINGLE ROLLER SHADES, PROVIDE MULTIBAND SHADES AT ALL LOCATIONS FOR OPERATION OF ALL BANDS SIMULTANEOUSLY USING A SINGLE ELECTRONIC DRIVE OPERATOR (ADD 01)		THROUGHOUT AT PERIMETER WINDOWS

ALL FINISHES SHALL COMPLY WITH CBC CHAPTER 8, WITH TITLE 19 CCR, & 2019 CFC CHAPTER 8.
ALL FLOORING SHALL HAVE A COEFFICIENT OF FRICTION GREATER THAN 0.6, PER ASTM C1028.
ALL FINISHES SHALL BE CLASS C AND TESTED IN ACCORDANCE W/ ASTM E84 OR UL 723.

RESTROOM ACCESSORIES SCHEDULE

TAG	EQUIPMENT	MANUFACTURER	ITEM/ MODEL NO.	COLOR	FINISH	SIZE	COMMENTS
GB-1	36" GRAB BAR	BOBRICK	1 1/4" DIA STAINLESS STEEL GRAB BAR WITH SNAP FLANGE - B-5806-1	STAINLESS STEEL	SATIN	36"	HORIZONTAL
GB-2	42" GRAB BAR	BOBRICK	1 1/4" DIA STAINLESS STEEL GRAB BAR WITH SNAP FLANGE - B-5806-1	STAINLESS STEEL	SATIN	42"	HORIZONTAL
MR-1	MIRROR	BOBRICK	MIRROR WITH STAINLESS STEEL CHANNEL FRAME B-165			24"W X 48"H	
HD-1	HAND DRYER	DYSON	LOW VOLTAGE AIRBLADE V HU02 307174-01	WHITE		15 1/2"X9 1/4"X4"D	
SD-1	SOAP DISPENSER - WALL	BOBRICK	AUTOMATIC WALL-MOUNTED SOAP DISPENSER B-2012	STAINLESS STEEL	SATIN	9 9/16"X4 3/16"X4 7/32"	
TTD-1/2	TOILET PAPER/SEAT COVER/ SANITARY NAPKIN DISPOSAL	BOBRICK	RECESSED TOILET SEAT COVER DISPENSER, SANITARY NAPKIN DISPOSAL, AND TOILET TISSUE DISPENSER B-3574	STAINLESS STEEL	SATIN	17 3/16"W X 30 5/8"H X 3 15/16"D	ROUGH WALL OPENING: 16"W X 29 1/4"H X 4"D
TSD-1	TOILET PAPER/SEAT COVER	BOBRICK	SURFACE MOUNTED TOILET SEAT COVER AND TOILET TISSUE DISPENSER B221	STAINLESS STEEL	SATIN	17 3/16"W X 30 5/8"H X 3 15/16"D	ROUGH WALL OPENING: 16"W X 29 1/4"HX4"D
WRC-1	PAPER TOWEL DISPENSER AND WASTE RECEPTACLE	BOBRICK	RECESSED CONVERTIBLE PAPER TOWEL DISPENSER AND WASTE RECEPTACLE B-3944	STAINLESS STEEL	SATIN		ROUGH WALL OPENING: 16"W X 54 3/4"H X 4"D

FINISH SCHEDULE GENERAL NOTES

A. SEE SPECIFICATION FOR PAINTING OF ITEMS NOT NOTED IN THE ROOM FINISH SCHEDULE OR FINISH PLANS.
B. EXPOSED CONCRETE FLOORS NOT SHOWN TO RECEIVE A FINISH SHALL RECEIVE LIQUID FLOOR TREATMENT OR CURING AND SEALING COMPOUND UNLESS NOTED OTHERWISE. SEE SPEC SECTION 033000.
C. ALL GYPSUM WALLBOARD BULKHEADS SHALL BE PAINTED PT-1 UNLESS NOTED OTHERWISE.
D. SEE REFLECTED CEILING PLANS FOR CEILING MATERIAL AND HEIGHT.
E. CEILING HEIGHTS, AS NOTED ON THE REFLECTED CEILING PLANS, ARE MEASURED FROM FINISH FLOOR OF THE ROOM.
F. CONTRACTOR SHALL FURNISH AND INSTALL WALL BASE AROUND CASEWORK AND MILLWORK.
G. WHERE FLOOR FINISH CHANGES FROM ONE ROOM TO ANOTHER, SET JOINT OF THE MATERIALS AT THE CENTER OF THE COMMUNICATING DOOR.
H. SEE SHEET A11.1 FOR TYPICAL TACKWALL DETAILS.
I. SEE SHEET A10.1 FOR ACOUSTICAL TACKWALL PANEL ELEVATIONS AND DIMENSIONS.
J. PROVIDE EDGE BAND AT ALL EDGES OF MDF DOORS AND DRAWER FRONTS TO MATCH DOOR/DRAWER FINISH. SUBMIT SAMPLE TO ARCHITECT FOR APPROVAL.

ROOM FINISH SCHEDULE SPECIFIC NOTES

FLOOR NOTES:

F1. DEPRESS CONCRETE SLAB 2 INCHES FOR CERAMIC/QUARRY TILE AND SETTING BED.
F2. DEPRESS CONCRETE SLAB 3/8 INCH FOR RECESS FLOOR MAT AND FRAME. VERIFY RECESS DEPTH WITH MANUFACTURER.
F3. SEE SHEET A12.1 FOR FLOOR PATTERN.
F4. SEE SHEET A12.1 FOR CERAMIC TILE FLOOR PATTERN.
F5. THIN-SET CERAMIC TILE FLOORS.

WALL NOTES:

W1. SEE SHEET A2.1 & A10.1 FOR CERAMIC TILE WALL ELEVATIONS.
W2. WALL PROTECTION WAINSCOT TO 4'-0" ABOVE FINISH FLOOR.
W3. PAINT THE JANITOR'S CLOSET WALLS BUT NOT INSIDE THE CHASE AREA.
W4. REFER TO SHEET A10.1 FOR WALL ELEVATIONS INDICATING WALL FINISH AND AWP PATTERNS.

CEILING NOTES:

C1. SEE REFLECTED CEILING PLANS FOR CEILING ACCENT PAINT COLORS AND LOCATIONS.
C2. PAINT EXPOSED STRUCTURE PT-1

MISCELLANEOUS ITEMS:

M1. PAINT HANDRAILS PT-5.
M2. PAINT INTERIOR DOORS AND FRAMES PT-6. PAINT EXTERIOR DOORS AND FRAMES PER A4.1

DLR GROUP
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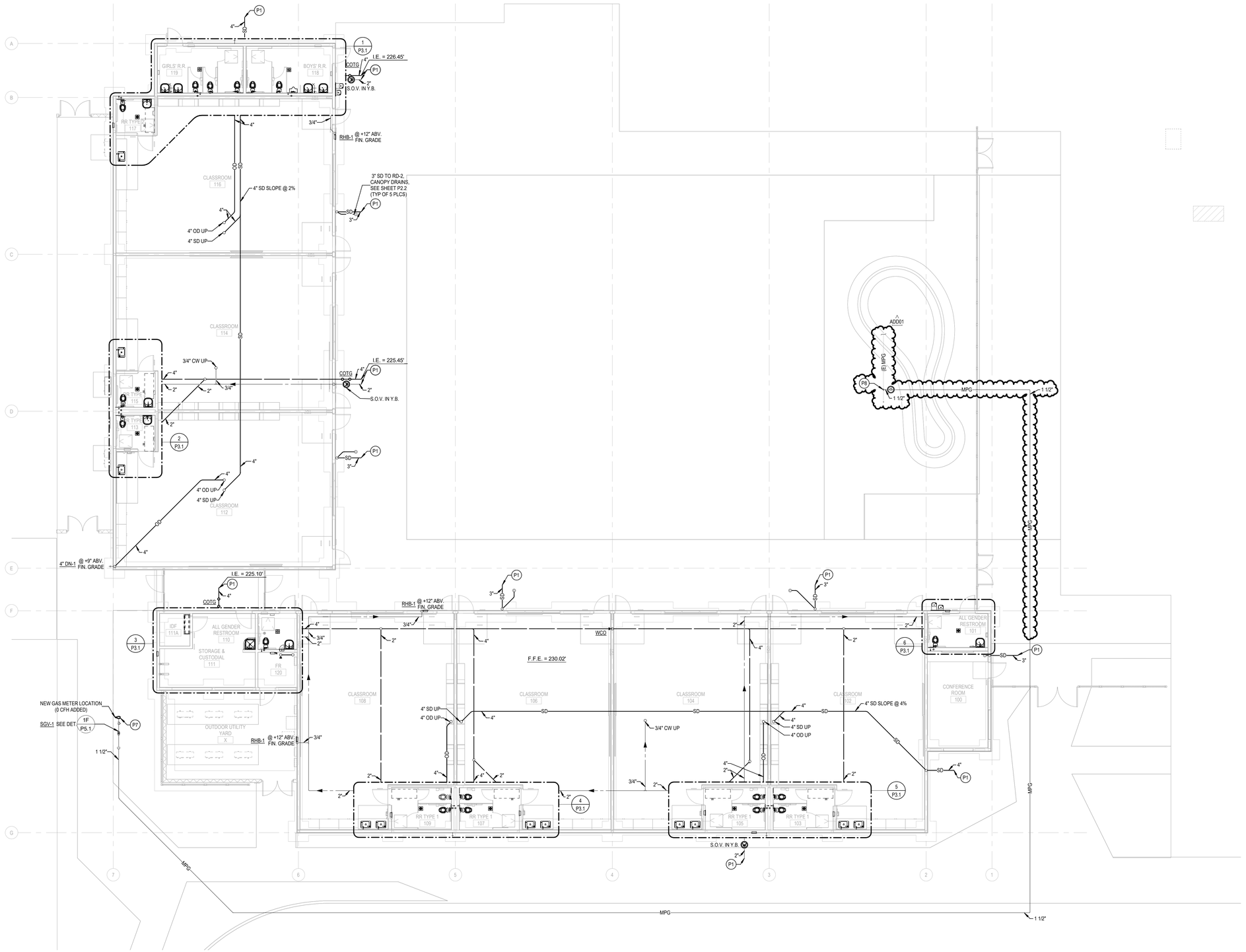
BATTLES ES - TK/K BUILDING
Santa Maria-Bonita School District
605 E Battles Rd, Santa Maria, CA 93454

CONSTRUCTION DOCUMENTS
12/16/2024
REVISIONS
ADD 01 2/5/2025 ADDENDUM 01

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

FINISH SCHEDULES

A12.0



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PLUMBING FLOOR PLAN

SCALE: 1/8" = 1'-0"

CONSTRUCTION NOTES

1. ALL HORIZONTAL STORM DRAIN PIPING ABOVE CEILING SHALL SLOPE AT 1% UNLESS OTHERWISE NOTED.
2. ALL CONDENSATE DRAIN PIPING ABOVE CEILING SHALL SLOPE AT 1% UNLESS OTHERWISE NOTED.
3. ALL SLEEVES THRU FOOTINGS SHALL BE MINIMUM TWO PIPE SIZES LARGER THAN THE PIPE GOING THRU IT, PROVIDE ALL SLEEVES.
4. ALL STORM DRAIN LINES, WASTE LINES & COLD-WATER LINES INTO FOOTINGS SHALL BE DOUBLE HALF LAP WRAPPED WITH 1/8" THICK "ARMOFLEX" INSULATION. ALSO, THE CONTRACTOR SHALL PROVIDE BLOCKED OUT AREAS IN THE FOOTING FOR STORM DRAIN LINES, WASTE LINES & COLD-WATER LINES. ALL PIPING SHALL AVOID THE LOWER 9" OF THE FOOTING.

KEY NOTES

P1 FOR CONTINUATION OF ALL UTILITIES SEE CIVIL ENGINEERING DRAWINGS.

P7 CONTRACTOR SHALL COORDINATE WITH SO. CAL GAS CO. FOR INSTALLATION OF THE NEW HIGH PRESSURE LINE AND ENSURE THAT THE NEW GAS METER LOCATION IS ADEQUATE TO ACCOMMODATE THE EXISTING GAS DEMAND.

P8 P.O.C. NEW 1-1/2" GAS LINE WITH GASCOCK TO EXISTING GAS LINE BELOW GRADE. FIELD VERIFY EXACT LOCATION PRIOR TO INSTALLATION OF ANY PIPING.

REGISTERED PROFESSIONAL ENGINEER
TIM CHAPMAN
No. M39133
Exp. 12/31/26
MECHANICAL
STATE OF CALIFORNIA

DLRGROUP

BATTLES

BEARS

BATTLES ES - TK/K BUILDING

Santa Maria-Bonita Schoolk District

605 E Battles Rd, Santa Maria CA 93454

CONSTRUCTION DOCUMENTS

02/20/2024

REVISIONS

AD001 03/17/25

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

PLUMBING FLOOR PLAN

P2.1

ABBREVIATIONS

(R)	RELOCATED
Ø	PHASE
A	AMPERE
A/E	ARCHITECT/ENGINEER
AC	ABOVE COUNTER
AF	AMP FRAME (CIRCUIT BREAKER)
AIC	AMPERE INTERRUPTING CAPACITY
AL	ALUMINUM
AMP	AMPERE
AP	WIRELESS ACCESS POINT
AT	AMP TRIP (CIRCUIT BREAKER OR FUSE)
ATS	AUTOMATIC TRANSFER SWITCH
AV	AUDIO-VIDEO, AUDIO-VISUAL
AWG	AMERICAN WIRE GAUGE
BAS	BUILDING AUTOMATION SYSTEM
BESS	BATTERY ENERGY STORAGE SYSTEM
BJ	BONDING JUMPER
BKR	BREAKER
BMS	BUILDING MANAGEMENT SYSTEM
C	CONDUIT
CAS	CASING
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CE	COVER ELEVATION
CEM	CEMENT
CFCI	CONTRACTOR FURNISHED CONTRACTOR INSTALLED
CG	CORNER GUARD
CH	CHANNEL
CJ	CONSTRUCTION JOINT
CKT	CIRCUIT
CKT BK	CIRCUIT BREAKER
CL	CIRCUIT LINE
CM	CEILING MOUNTED
CMP	CORRUGATED METAL PIPE
CO	CONDUIT ONLY
COMP	COMPOSITE
COOR	COORDINATE
COORD	COORDINATE
CSK	COUNTERSUNK
CT	CURRENT TRANSFORMER
CTL	CONTROL
CU	COPPER
CWV	COMBINATION WASTE AND VENT
DB	DECIBEL
DC	DIRECT CURRENT
DISC	DISCONNECT
DP	DISTRIBUTION PANELBOARD
DW	DISHWASHER
ECS	EMERGENCY COMMUNICATION SYSTEM
EGB	ELECTRICAL GROUNDING BUSBAR
EMD	ESTIMATED MAXIMUM DEMAND
EMGB	ELECTRICAL MAIN GROUNDING BUSBAR
EP	EXPLOSION PROOF
ERMS	ENERGY REDUCTION MAINTENANCE SWITCH
EWC	ELECTRIC WATER COOLER
FA	FIRE ALARM
FAA	FIRE ALARM ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
FADC	FIRE ALARM DOCUMENT CABINET
FLA	FULL LOAD AMPS
FS	FLOW SWITCH
FSD	FIRE SMOKE DAMPER
G	EQUIPMENT GROUNDING CONDUCTOR
GEN	GENERATOR
GFI, GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFPE	GROUND FAULT PROTECTION OF EQUIPMENT
GND	EQUIPMENT GROUNDING CONDUCTOR
HH	HANDHOLE
HOA	HAND-OFF-AUTOMATIC
HP	HORSE POWER
IC	INTERCOM
IG	ISOLATED GROUND
JB	JUNCTION BOX
KAIC	THOUSAND AMPERE INTERRUPTING CIRCUIT
KV	KILOVOLT
KVA	KILOVOLT AMPERES
KW	KILOWATT
LT	LIGHT
LTG	LIGHTING
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MH	MANHOLE
MLO	MAIN LUGS ONLY
MOCP	MAXIMUM OVERCURRENT PROTECTION
MRTS	MOTOR RATED TOGGLE SWITCH
MSB	MAIN SWITCHBOARD
MTD	MOUNTED
MTG	MOUNTING
MTS	MAIN TRANSFER SWITCH
N	NEUTRAL
NC	NORMALLY CLOSED
NF	NON-FUSED
NL	NIGHT LIGHT
NO	NORMALLY OPEN
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OS&Y	OUTSIDE SCREW AND YOKE
P	POLE(S)
PA	PUBLIC ADDRESS
PB	PULL BOX
PH	PHASE
PIV	POST INDICATOR VALVE
PNL	PANEL
PWR	POWER
RCP	REFLECTED CEILING PLAN
RECPT	RECEPTACLE
REF	REFERENCE
RESP	RESPONSIVE
SCCR	SHORT CIRCUIT CURRENT RATING
SD	SMOKE DAMPER
SEC	SECONDARY
SPD	SURGE PROTECTION DEVICE
SWBD	SWITCHBOARD
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TC	TIME CLOCK
TGB	TELECOMMUNICATIONS GRONDING BUSBAR
TMGB	TELECOMMUNICATIONS MAIN GRONDING BUSBAR
TO	TELECOMMUNICATIONS OUTLET
TR	TELECOMMUNICATIONS ROOM
TS	TAMPER SWITCH
TV	TELEVISION
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTABLE POWER SUPPLY
V	VOLT
VA	VOLT-AMPERE
VFD	VARIABLE FREQUENCY DRIVE
W	WIRE
WA	TELECOMMUNICATIONS WORK AREA
WG	WIRE GUARD
WP	WEATHER-PROOF (NEMA 3R)
XFMR	TRANSFORMER

NOTES

GENERAL NOTES

1 MODIFICATIONS TO EXISTING POWER DISTRIBUTION EQUIPMENT: MATCH EXISTING MANUFACTURER, SWITCH TYPE, FUSE TYPE, BREAKER TYPE AND KAIC RATING FOR ALL INSTALLED DEVICES.
2 EXISTING PANEL DIRECTORIES AT PANELS AFFECTED BY WORK: PROVIDE UPDATED TYPED PANEL DIRECTORY. CONSULT OWNER FOR INPUT ON LABELING OF ALL EXISTING CIRCUITS.
3 DEVICES AND LIGHT FIXTURES DENOTED 'ER' ARE EXISTING TO BE RELOCATED. NOTIFY A/E IF DEVICES OR FIXTURES ARE DAMAGED.

GENERAL DEMOLITION NOTES

1 ITEMS INDICATED ON DEMOLITION PLANS ARE BASED ON AS-BUILT DRAWINGS AND FIELD OBSERVATIONS AND ARE INTENDED TO GIVE THE BIDDER A GENERAL REPRESENTATION OF EXISTING CONDITIONS.
2 REMOVE ALL ITEMS SHOWN FULL-TONE OR NOTED ELSEWHERE IN THE DOCUMENTS TO BE REMOVED OR DEMOLISHED. DEMOLISH ADDITIONAL ITEMS NOT SHOWN ON DRAWINGS, BUT WHICH MUST BE REMOVED TO COMPLETE THE PROJECT.
3 ITEMS SHOWN HALF-TONE ARE EXISTING TO REMAIN.
4 RELOCATE ITEMS DENOTED 'ER'. SEE LIGHTING, POWER AND/OR SPECIAL SYSTEM SHEETS FOR NEW LOCATIONS. 'ER' IS DEFINED AS EXISTING (TO BE) RELOCATED.
5 EXISTING CONDUIT MAY REMAIN IF ALL THE FOLLOWING ARE TRUE:
A. IT CAN BE REUSED TO FEED DEVICES INSTALLED UNDER THIS CONTRACT.
B. IT DOES NOT INTERFERE WITH OTHER TRADES.
C. IT WAS ORIGINALLY INSTALLED MEETING SPECIFICATIONS RELATED TO THIS PROJECT.
D. IT WILL NOT BE EXPOSED IN A FINISHED AREA (UNLESS NOTED OTHERWISE).
6 PROVIDE ELECTRICAL DEMOLITION ASSOCIATED WITH MECHANICAL EQUIPMENT TO BE REMOVED. IN ADDITION TO DEVICES SHOWN, REFER TO MECHANICAL AND ARCHITECTURAL DEMOLITION SHEETS TO DETERMINE EQUIPMENT TO BE REMOVED.
7 MAINTAIN FUNCTIONALITY OF ALL EXISTING LOW VOLTAGE SYSTEMS INCLUDING, BUT NOT LIMITED TO, TELECOM CABLING NETWORKS, INTERCOM, CLOCKS, FIRE ALARM, SAFETY AND SECURITY DURING ALL PHASES OF CONSTRUCTION. PROVIDE TEMPORARY INTERCONNECTIONS AS REQUIRED TO ACCOMMODATE CONSTRUCTION SCHEDULE.

GENERAL SITE PLAN NOTES

1 ALL LIGHTING AND POWER CONDUCTORS SHALL BE INSTALLED BETWEEN 24" (MINIMUM) AND 36" (MAXIMUM) BELOW FINISHED GRADE.
2 ALL COMMUNICATIONS CONDUIT AND CABLES SHALL BE INSTALLED 36" (MINIMUM) BELOW FINISHED GRADE.
3 ALL CONDUCTORS FOR EXTERIOR LIGHTING AND POWER CIRCUITS SHALL BE #10 AWG MINIMUM.
4 PROVIDE TRANSFORMER BASE AT ALL POLE MOUNTED FIXTURES, TAP 2 LEGS OF THREE PHASE FEEDER (CIRCUITS DENOTED), PROVIDE BALLAST FUSES AT TAP, AND PROVIDE BRANCH CIRCUITS TO FIXTURES.

GENERAL SITE DEMOLITION NOTES

1 SEE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR PHASES OF DEMOLITION AND CONSTRUCTION. COORDINATE WITH GENERAL CONSTRUCTION.
2 DISCONNECT AND REMOVE ALL ELECTRICAL DEVICES AND LIGHTING FIXTURES IN DEMOLITION AREAS UNLESS NOTED OTHERWISE.
3 COORDINATE AND VERIFY REQUIREMENTS WITH NEW WORK IN AREA.

GENERAL POWER NOTES

1 VERIFY ANY NEUTRAL WIRES REQUIRED ON 1Ø OR 3Ø MECHANICAL UNITS FURNISHED UNDER DIVISION 23. IF REQUIRED, PROVIDE NEUTRAL.
2 PROVIDE DEDICATED 120-VOLT CIRCUITS TO ALL HVAC BAS CONTROL DEVICES AND PANELS. COORDINATE QUANTITY WITH DIVISION 23. UTILIZE NEAREST SPARE 120-VOLT, 20/1 BREAKER. LABEL TYPED PANEL DIRECTORY ACCORDING TO LOAD BEING SERVED.
3 IN ADDITION TO DEVICES SHOWN, SEE SCHEDULE SHEETS FOR CONNECTIONS TO ALL MECHANICAL EQUIPMENT.
4 LOCATE SWITCHES FOR CONTROL OF FANS IN TWO-GANG BOX WITH LIGHT SWITCH WHERE APPLICABLE.
5 PROVIDE #10AWG CONDUCTORS FOR ALL WARM AIR DRYER CIRCUITS. PROVIDE LOCKOUT DEVICE AT ALL BREAKERS SERVING WARM AIR DRYERS.

GENERAL LIGHTING NOTES

1 SEE LIGHT FIXTURE SCHEDULE AND SYMBOLS LEGEND FOR MOUNTING HEIGHTS, UNLESS NOTED OTHERWISE.
2 PROVIDE #10AWG MINIMUM CONDUCTORS FOR ALL EXTERIOR LIGHTING CIRCUITS.
3 SEE ARCHITECTURAL BUILDING ELEVATIONS FOR LOCATION OF BUILDING MOUNTED EXTERIOR LIGHT FIXTURES.
4 PROVIDE BEAD OF SILICONE SEALANT AROUND RECESSED BACK BOX PERIMETER AT ALL BUILDING MOUNTED EXTERIOR LIGHT FIXTURE LOCATIONS.
5 CIRCUIT FIXTURES DENOTED WITH 'NL' AS UNSWITCHED NIGHT LIGHTS.
6 FIXTURES DENOTED WITH LOWER CASE LETTERS SHALL BE CONTROLLED BY SWITCHES DENOTED WITH THE SAME LOWER CASE LETTER IN EACH ROOM.

LIST OF APPLICABLE CODES
2022 California Administrative Code (CAC), Part 1, Title 24 CCR
2022 California Building Code (CBC), Part 2, Title 24 CCR
2022 California Electrical Code (CEC), Part 3, Title 24 CCR
2022 California Mechanical Code (CMC), Part 4, Title 24 CCR
2022 California Plumbing Code (CPC), Part 5, Title 24 CCR
2022 California Energy Code (CEC), Part 6, Title 24 CCR
2022 California Fire Code (CFC), Part 9, Title 24 CCR
2022 California Existing Building Code (CEBC), Part 10, Title 24 CCR
2022 California Green Building Standards Code (CALGreen), Part 11, Title 24 CCR
2022 California Referenced Standards Code, Part 12, Title 24 CCR
Title 19 CCR, Public Safety, State Fire Marshal Regulations

APPLICABLE STANDARDS
For a complete list of applicable standards, including California amendments to the NFPA Standards, refer to 2022 CBC Chapter 35 and California Fire Code Chapter 80.

APPLICABLE CODE: 2022 CBC 02/05/2022 REVISED: 02/14/2022

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 2022 CBC SECTIONS 1617A.1.18 THROUGH 1617A.1.26 AND ASCE 7-16 CHAPTERS 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 EXCEPT PLUGS FOR 110/220 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.
3. TEMPORARY, MOVABLE 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 ASSOCIATED DUCTWORK, PIPING, AND CONDUIT. FLEXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTIONS:

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVING 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 FLOOR 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 NOTE

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 SECTIONS 13.6.5, 13.6.6, 13.6.7, 13.6.8; AND 2022 CBC, SECTIONS 1617A.1.24, 1617A.1.25 AND 1617A.1.26.

THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEM ARE AS NOTED BELOW. WHEN BRACING AND ATTACHMENTS ARE BASED ON A PREAPPROVED INSTALLATION GUIDE (E.G., HCAI 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 DISTRIBUTION 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), PLUMBING PIPING (PP), ELECTRICAL DISTRIBUTION 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 HCAI PRE-APPROVAL (OPM #)

SEE SHEET S6.21 DETAIL NO. 36 FOR CONDUIT SUPPORT AND SEISMIC BRACING DESIGN.

PHOTOVOLTAIC SYSTEM NOTE:
PHOTOVOLTAIC SYSTEM FOR THIS PROJECT INSTALLED UNDER A#03-124188

GENERAL SYSTEMS NOTES

DIVISION 26
1 TELECOMMUNICATIONS OUTLETS: PROVIDE TWO-GANG BOX (2.25-INCH DEEP MINIMUM) WITH SINGLE-GANG STRAP MOUNT PLASTER RING AND 1-INCH CONDUIT STUBBED INTO ACCESSIBLE SPACE ABOVE FINISHED CEILING (EXCEPTION: VOICE-ONLY OR VIDEO-ONLY OUTLETS PER NOTE BELOW).
2 TELECOMMUNICATIONS OUTLET INDICATED AS ROUGH IN ONLY (NO SUBSCRIPTS): INSTALL PER NOTE ABOVE, WITH BLANK 302SS SINGLE-GANG WALLPLATE.
3 VOICE-ONLY OR VIDEO-ONLY TELECOMMUNICATIONS OUTLET: PROVIDE SINGLE-GANG BOX WITH 1-INCH CONDUIT STUBBED INTO ACCESSIBLE SPACE ABOVE FINISHED CEILING.
4 MISCELLANEOUS LOW VOLTAGE OUTLETS (CALL STATIONS, HANDSETS, VOLUME CONTROL, MICROPHONE OUTLETS, SURFACE-MOUNT WALL SPEAKERS AND FIRE ALARM DEVICES): PROVIDE SINGLE-GANG BOX WITH 3/4-INCH CONDUIT STUBBED INTO ACCESSIBLE SPACE ABOVE FINISHED CEILING.
5 INSULATED BUSHINGS: PROVIDE BUSHINGS ON ALL CONDUIT STUB UPS, INCLUDING BUT NOT LIMITED TO, OUTLETS FOR TELECOMMUNICATIONS, FIRE ALARM, SECURITY, ACCESS CONTROL, MASS NOTIFICATION, PUBLIC ADDRESS, ALL OTHER LOW VOLTAGE INTERCOMMUNICATIONS AND UNUSED STUB-UPS OR STUB-UPS INDICATED FOR FUTURE USE.
6 FLOOR BOXES CONTAINING TELECOMMUNICATIONS OUTLETS: FOR EACH LOW-VOLTAGE COMPARTMENT, ROUTE 1-INCH CONDUIT WITH PULL STRING UNDERFLOOR, UP NEAREST WALL, AND STUB INTO ACCESSIBLE SPACE ABOVE FINISHED CEILING. LABEL CONDUIT END 'FLOOR BOX'
7 SLEEVES FOR LOW VOLTAGE CABLES: PROVIDE 2-INCH SLEEVES UNLESS NOTED OTHERWISE. COORDINATE WITH PATH OF DUCTWORK AND GWB CEILING TO ENSURE ACCESSIBILITY, EXTEND SLEEVES AS REQUIRED. INSTALL ALL SLEEVES 4-INCHES ABOVE HIGHER CEILING OF TWO ADJACENT SPACES. REFER TO ROOM FINISH SCHEDULES AND REFLECTED CEILING PLANS FOR CEILING HEIGHTS. STUB SLEEVES INTO JOIST SPACE OF FINISHED ROOMS WITH EXPOSED STRUCTURE. PROVIDE INSULATED BUSHINGS ON BOTH ENDS OF ALL SLEEVES, INCLUDING UNUSED SLEEVES. PROVIDE GROUT OR ESCUTCHEONS TO SECURE SLEEVES TO WALL. PROVIDE FIRE-RATED SLEEVES AT ALL FIRE-RATED WALLS.
8 PROVIDE ADDITIONAL CONDUIT, BOXES, CONDUCTORS AND OVERCURRENT PROTECTION FOR 120-VOLT BRANCH CIRCUITS NOT SPECIFICALLY COVERED UNDER DIVISION 26 WORK, BUT REQUIRED TO COMPLETE DIVISION 08 AND 28 WORK. DEVICES SHALL INCLUDE, BUT NOT BE LIMITED TO, POWER SUPPLIES FOR DOOR HARDWARE, ACCESS CONTROL, FIRE ALARM AND VIDEO SURVEILLANCE.
9 CARD READERS: PROVIDE RECESSED SINGLE-GANG BOX WITH GASKETED BLANK COVERPLATE AND EMPTY 1-INCH CONDUIT STUBBED INTO NEAREST ACCESSIBLE SPACE ABOVE FINISHED CEILING OR JOIST SPACE OF ADJACENT EXPOSED STRUCTURE. LABEL CONDUIT END 'CARD READER'.
10 PROVIDE WATERFALL DROPOUTS AT ALL CABLE TRAY LOCATIONS ABOVE RUNWAYS, WALL/FLOOR MOUNTED RACKS, AND EQUIPMENT ENCLOSURES.
11 AUDIO VISUAL (AV) SYSTEMS: PROVIDE RECESSED BOXES, CONDUIT AND PULL STRINGS FOR ALL SYSTEM COMPONENTS.

GENERAL SYSTEMS NOTES

DIVISION 27
1 ALL SPEAKERS AND HORN-TYPE SPEAKERS ARE PART OF THE INTERCOM SYSTEM, UNLESS NOTED OTHERWISE.
2 PROVIDE SURFACE MOUNT ENCLOSURE AND BAFFLE FOR ALL SPEAKERS IN FINISHED SPACES WITH NO CEILINGS (EXPOSED STRUCTURE).
3 PROVIDE WIREGUARDS ON ALL CLOCKS IN GYMNASIUMS.
4 UTILIZE SLEEVES AND FIRE RATED SLEEVES AT RATED WALLS PROVIDED UNDER DIVISION 26 FOR INSTALLATION OF ALL LOW VOLTAGE CABLING. FOLLOW INDUSTRY STANDARDS TO MAINTAIN 40% FILL REQUIREMENTS IN ALL SLEEVES (SUPERSEDES NEC - DO NOT FILL SLEEVES TO CAPACITY). PROVIDE ADDITIONAL SLEEVES MEETING DIVISION 26 REQUIREMENTS AS REQUIRED.
5 SYSTEM PANEL LOCATIONS: AUXILIARY SYSTEM PANELS, POWER SUPPLIES OR OTHER EQUIPMENT ENCLOSURES SHALL NOT BE LOCATED IN TELECOM ROOMS UNLESS NOTED OTHERWISE. IF DRAWINGS DO NOT DEPICT LOCATIONS FOR AUXILIARY COMPONENTS, CONSULT OWNER OR A/E FOR APPROVED LOCATIONS PRIOR TO EQUIPMENT INSTALL.

GENERAL DEVICE BOX NOTES

1 SEE SYMBOLS LEGEND THIS SHEET FOR MOUNTING HEIGHTS UNLESS NOTED OTHERWISE ON DRAWINGS.
2 ALL MOUNTING HEIGHTS ARE TO CENTERLINE OF BOXES UNLESS NOTES OTHERWISE.
3 PROVIDE BOX EXTENDER FOR FLUSH INSTALLATION OF DEVICES LOCATED IN ARCHITECTURAL CASEWORK THAT IS FLUSH WITH ADJACENT WALL (SUCH AS RECEPTACLES FOR GARBAGE DISPOSERS).
4 FLOOR BOXES: OBTAIN OWNER APPROVAL OF ALL BOX LOCATIONS PRIOR TO ROUGH IN. PROVIDE DEVICE PLATES AT DEVICES AND BLANK PLATES AT ALL UNUSED COMPARTMENTS.
5 COORDINATE LOCATION OF DEVICE BOXES FOR SWITCHES, RECEPTACLES, AND SYSTEMS DEVICES WITH MARKERBOARDS. ADJUST BOX LOCATIONS TO AVOID MARKERBOARDS.
6 COORDINATE LOCATION OF DEVICE BOXES FOR SWITCHES, RECEPTACLES, AND SYSTEMS DEVICES WITH TACKBOARDS. ADJUST BOX LOCATIONS TO AVOID TACKBOARDS. PROVIDE BOX EXTENDER FOR A FLUSH INSTALLATION WHERE DEVICES MUST BE MOUNTED AT TACKBOARD/TACKWALL.
7 CEILING MOUNTED RECEPTACLES: AT SUSPENDED CEILINGS, ROUTE POWER TO RECEPTACLE VIA FLEXIBLE METALLIC CONDUIT WITH 6-FOOT SERVICE LOOP. FEED FMC FROM A J-BOX RIGIDLY SUPPORTED A MAXIMUM OF 24-INCHES ABOVE SUSPENDED CEILING OR AT BOTTOM OF STRUCTURE ABOVE, WHICHEVER IS LOWER. LOCATE J-BOX DIRECTLY ABOVE RECEPTACLE AND SUPPORT VIA STRUCTURE, OR VIA THREAD ROD AND UNISTRUT HUNG FROM STRUCTURE ABOVE IN HIGH STRUCTURE APPLICATIONS.
8 DEVICES RECESSED IN MULLIONS: BACK BOXES TO BE RECESSED FOR FLUSH INSTALLATION OF DEVICE AND WALLPLATE. EXTEND CONCEALED CONDUIT IN MULLION UP TO WALL ABOVE AND STUB OUT ABOVE ACCESSIBLE CEILING. IN AREAS WITH NO CEILING, EXTEND CONDUIT TOWARDS CABLING SOURCE TO ABOVE NEAREST ACCESSIBLE CEILING.

ELECTRICAL SYMBOLS

LIGHTING

LUMINAIRE TAG

HALF-FILLED* FOR LUMINAIRES ON EMERGENCY SYSTEM
*FULL-FILLED FOR LUMINAIRES ON CRITICAL SYSTEMS
XXX — LUMINAIRE ID
XXX-XX — CKT DESIGNATION (PNL-CKT #)
XXX-XX — RELAY PANEL - RELAY # OR LOCAL SWITCH DESIGNATION
TYP. — APPLIES TO ALL LUMINAIRES IN A SPACE UNO

LUMINAIRES

- LUMINAIRE
- LINEAR LUMINAIRE
- CYLINDIRCAL LUMINAIRE
- LIGHTING TRACK, TRACK MOUNTED LUMINAIRES
- LUMINAIRE
- WALL MOUNTED LUMINAIRE MOUNT 96" AFF, UNO
- WALL MOUNTED LUMINAIRE MOUNT 96" AFF, UNO
- WALL WASHING LUMINAIRE
- HIGH BAY LUMINAIRE
- SELF CONTAINED EMERGENCY LIGHTING UNIT MOUNT 94-INCHES AFF, UNO
- EXIT SIGN, CEILING MOUNTED, DIRECTIONAL ARROW(S) AS INDICATED
- EXIT SIGN, WALL MOUNTED, DIRECTIONAL ARROW(S) AS INDICATED. MOUNT 94-INCHES AFF, UNO

AREA LIGHTING

- SITE LIGHTING - POLE
- POLE MOUNTED AREA LIGHTING FIXTURE
- POLE WITH POLE MOUNTED AREA LIGHTING FIXTURE
- WALL MOUNTED AREA LIGHTING FIXTURE
- IN GRADE LIGHT FIXTURE
- BOLLARD LIGHT FIXTURE

LIGHTING CONTROL DEVICES

- RPx LIGHTING CONTROL PANEL
- CVx CENTRAL INVERTER
- R LOW VOLTAGE RELAY
- PC PHOTOELECTRIC CELL
- LC LIGHTING CONTACTOR
- BAT REMOTE EMERGENCY BATTERY PACK

SWITCHES AND WALL-BOX CONTROLS

SWITCHES: MOUNT 42-INCHES AFF UNO
SUPERSCRIPT, SWITCH SHALL CONTROL FIXTURE DENOTED WITH SAME LOWER CASE LETTER
SWITCH SYMBOL
SUBSCRIPT, SWITCH TYPE - SEE BELOW OR REFER TO THE CONTROL SCHEDULE IF APPLICABLE
LINE THRU SWITCH INDICATES A KEY OPERATED SWITCH

- S SWITCH, SINGLE POLE
- S_2 SWITCH, DOUBLE POLE
- S_3 SWITCH, 3-WAY
- S_4 SWITCH, 4-WAY
- S_D SWITCH, DIMMER
- S_E SWITCH, EMERGENCY
- S_L SWITCH, LOW VOLTAGE
- S_{MC} SWITCH, MOMENTARY CONTACT
- S_O SWITCH, WALL-BOX OCCUPANCY SENSOR
- S_{O2} SWITCH, WALL-BOX OCCUPANCY SENSOR, 2-POLE
- S_P SWITCH WITH PILOT LIGHT
- S_R SWITCH, LOW VOLTAGE, ASSOCIATED WITH RELAY PANEL
- S_T SWITCH, TIMER
- S_{ES} SWITCH, ECO-SYSTEM
- S_{EP} SWITCH, EXPLOSION-PROOF

CEILING MOUNTED LIGHTING CONTROL DEVICES
MAXIMUM MOUNTING HEIGHT OF 10-FEET AFF

- OS OCCUPANCY SENSOR
- VS VACANCY SENSOR

WALL MOUNTED LIGHTING CONTROL DEVICES:
MOUNT 94-INCHES AFF, UNO

- OS OCCUPANCY SENSOR
- VS VACANCY SENSOR

THEATRICAL LIGHTING DEVICES:

- LCD THEATRICAL LIGHTING LCD STATION MOUNT 50-INCHES AFF, UNO
- E THEATRICAL LIGHTING ENTRY STATION MOUNT 42-INCHES AFF, UNO
- TO THEATRICAL OUTLET BOX MOUNT 18-INCHES AFF, UNO
- TN THEATRICAL NETWORK OUTLET MOUNT 18-INCHES AFF, UNO
- TC THEATRICAL CONTROL CONSOLE OUTLET MOUNT 18-INCHES AFF, UNO

POWER

- CIRCUIT HOME RUN
- CONDUIT TURNING UP
- CONDUIT TURNING DOWN
- CONDUIT STUB-UP
- CONDUIT SLEEVE
- CONDUIT SEAL
- CONDUIT CONCEALED IN CEILING OR WALLS, POWER
- CONDUIT CONCEALED IN CEILING OR WALLS, OTHER (* = SEE ABBREVIATIONS)
- CONDUIT CONCEALED IN FLOOR OR UNDERGROUND, POWER
- CONDUIT CONCEALED IN FLOOR OR UNDERGROUND, OTHER (* = SEE ABBREVIATIONS)
- EXPOSED CONDUIT, POWER
- EXPOSED CONDUIT, OTHER (* = SEE ABBREVIATIONS)
- FRS FIRE RATED SLEEVE
- T TRANSFORMER
- XXX BRANCH CIRCUIT PANELBOARD MOUNT 72-INCHES TO TOP
- XXX DISTRIBUTION PANELBOARD MOUNT 72-INCHES TO TOP
- EQUIPMENT CABINET, AS NOTED
- XXX SWITCHBOARD
- MOTOR STARTER OR DRIVE
- DISCONNECT SWITCH
- COMBINATION STARTER / DISCONNECT SWITCH
- CT CURRENT TRANSFORMER ENCLOSURE
- M METER
- GEN GENERATOR
- ATS AUTOMATIC TRANSFER SWITCH
- SYSTEM GROUND ELECTRODE
- T THERMOSTAT
- MUSHROOM SWITCH
- MH ELECTRICAL MANHOLE
- HH ELECTRICAL HAND HOLE
- M MOTOR CONNECTION, HORSEPOWER AS INDICATED
- S_F FUSE AND SWITCH ASSEMBLY
- S_T MANUAL CONTROLLER WITH THERMAL OVERLOAD
- S_M MANUAL CONTROLLER W/O THERMAL OVERLOAD
- B ENCLOSED CIRCUIT BREAKER
- PB PULL BOX
- EQUIPMENT CONNECTION
- CABLE TRAY, LADDER TYPE OR RUNWAY
- CABLE TRAY
- MULTI-OUTLET ASSEMBLIES MOUNT 18-INCHES AFF, UNO WHERE DENOTED 'AC', MOUNT ABOVE COUNTER
- DIVIDED SURFACE RACEWAY MOUNT 18-INCHES AFF, UNO WHERE DENOTED 'AC', MOUNT ABOVE COUNTER

PUSHBUTTON STATION: MOUNT 42-INCHES AFF UNO

- SWITCH, PUSH BUTTON, SINGLE
- SWITCH, PUSH BUTTON, DOUBLE
- SWITCH, PUSH BUTTON, TRIPLE

RECEPTACLES: MOUNT 15-INCHES AFF, UNO

DIAGONAL LINE THROUGH SYMBOL OR DENOTED 'AC' INDICATES MOUNT DEVICE ABOVE COUNTER.
WHERE INDICATED AS 'MOUNT ABOVE COUNTER' MOUNT AT 48-INCHES AFF OR 9 INCHES ABOVE COUNTER.

LABELS SHALL BE MACHINE PRINTED, UNO

- SIMPLEX RECEPTACLE
- DUPLEX RECEPTACLE
- DUPLEX RECEPTACLE, GFI TYPE
- DUPLEX RECEPTACLE, MOUNT ABOVE COUNTER
- DUPLEX RECEPTACLE, GFI TYPE, MOUNT ABOVE COUNTER
- FOURPLEX RECEPTACLE
- FOURPLEX RECEPTACLE, GFI TYPE
- FOURPLEX RECEPTACLE, MOUNT ABOVE COUNTER
- FOURPLEX RECEPTACLE, GFI TYPE, MOUNT ABOVE COUNTER
- DUPLEX RECEPTACLE, FLUSH IN CEILING
- FOURPLEX RECEPTACLE, FLUSH IN CEILING
- DUPLEX RECEPTACLE, HORIZONTALLY MOUNTED
- DUPLEX RECEPTACLE, HORIZ. MTD, GFI TYPE
- DUPLEX RECEPTACLE, HORIZ. MTD, ABOVE COUNTER
- DUPLEX RECEPTACLE, HORIZ. MTD, GFI TYPE, MOUNT ABOVE COUNTER
- R WEATHER RESISTANT GFI DUPLEX RECEPTACLE, ROOF MOUNT 18-INCHES ABOVE ADJACENT STRUCTURE WITH A WEATHERPROOF, IN-USE COVER
- WP WEATHER RESISTANT GFI DUPLEX RECEPTACLE, MOUNT 18-INCHES AFF WITH A WEATHERPROOF, IN-USE COVER
- EWC STD DUPLEX RECEPTACLE TO SERVE ELECTRIC WATER COOLER, MOUNT AT HEIGHT PER EQUIPMENT MANUFACTURER'S INSTALLATION GUIDELINES. WIRE TO GFCI BKR IN PANELBOARD.
- TV DUPLEX RECEPTACLE TO SERVE TELEVISION, MOUNT AT SAME HEIGHT AND WITHIN 8-INCHES OF ADJACENT TV OUTLET
- DUPLEX RECEPTACLE, EMERGENCY
- FOURPLEX RECEPTACLE, EMERGENCY
- DUPLEX RECEPTACLE, LOWER SWITCH
- DUPLEX RECEPTACLE, SWITCHED
- FOURPLEX RECEPTACLE, SWITCHED
- RANGE RECEPTACLE, MOUNT 8-INCHES AFF
- SPECIAL RECEPTACLE, DEEP WELL BOX
- FLUSH FLOOR OUTLET BOX UNO
- FLUSH FLOOR BOX WITH DUPLEX RECEPTACLE UNO
- MULTI-DEVICE FLOOR BOX WITH DUPLEX RECEPTACLE AND TELECOMMUNICATIONS OUTLETS
- USB ONLY RECEPTACLE
- RECEPTACLE WITH USB PORTS
- FLUSH JUNCTION BOX, CEILING MOUNTED
- P JUNCTION BOX FOR FUTURE PROJECTOR POWER MOUNT 24-INCHES ABOVE SUSPENDED CEILING MOUNT TIGHT TO CEILING AT EXPOSED STRUCTURE LABEL BOX COVER 'PROJECTOR POWER'
- JUNCTION BOX ABOVE SUSPENDED CEILING WITH FLEX CONNECTION
- FLUSH JUNCTION BOX, WALL MOUNTED
- SURFACE JUNCTION BOX, WALL MOUNTED
- SURFACE JUNCTION BOX, CEILING MOUNTED
- HAND DRYER, INSTALL HAND DRYER SPECIFIED IN DIV. 11

COMMUNICATIONS

TELECOMMUNICATIONS OUTLETS: MOUNT 18-INCHES AFF, UNO, AND WITHIN 8-INCHES OF ADJACENT RECEPTACLE
WHERE DENOTED 'AC', MOUNT ABOVE COUNTER
WHERE DENOTED 'C', MOUNT FLUSH IN CEILING

- X,Y,Z TELECOMMUNICATIONS OUTLET PROVIDE JACKS UNDER A COMMON FACEPLATE:
X = QTY OF VOICE JACKS
Y = QTY OF DATA JACKS
Z = QTY OF VIDEO JACKS
1 "C" = CEILING MOUNT
- TELECOMMUNICATIONS OUTLET MOUNTED IN FLOOR BOX
- AP WIRELESS ACCESS POINT
- AP WIRELESS ACCESS POINT, WALL MOUNTED
- ANALOG VOICE ONLY TELECOM OUTLET (TELEPHONE OUTLET) MOUNT 18-INCHES AFF, UNO. EQUIVALENT TO 1,0,0 WHERE DENOTED 'W' MOUNT 50-INCHES AFF
- TV VIDEO ONLY TELECOM OUTLET (TELEVISION OUTLET) MOUNT 94-INCHES AFF, UNO. EQUIVALENT TO 0,0,1
- TV TELEVISION OUTLET, FLUSH IN CEILING
- AV AV OUTLET.
- FLOOR MOUNTED TELECOMMUNICATIONS RACK

CLOCKS: MOUNT 94-INCHES AFF, UNO

- CLOCK - WALL MOUNT
- DS CLOCK - DOUBLE FACE
- C CLOCK - OUTLET
- M CLOCK - MASTER
- DS CLOCK - CEILING MOUNT, DOUBLE FACE

BELLS, BUZZERS, CHIMES AND WALL SPEAKERS: MOUNT 94-INCHES AFF, UNO

- CLASS PROGRAM BELL
- BUZZER
- C CHIME
- S SPEAKER, WALL
- S SPEAKER, FLUSH IN CEILING, ENCLOSED IN BACKBOX WHERE EXPOSED
- S PA PUBLIC ADDRESS (A/V) SYSTEM SPEAKER, FLUSH IN CEILING
- H SPEAKER/HORN, WALL
- C INTERCOM CALLBACK STATION MOUNT 42-INCHES AFF
- C 2 TWO-WAY INTERCOM/CALL STATION COMBINATION UNIT MOUNT 42-INCHES AFF
- C M INTERCOM MASTER STATION OUTLET MOUNT 18-INCHES AFF
- H INTERCOM HANDSET MOUNT 50-INCHES AFF
- V VOLUME CONTROL, WALL MOUNT 42-INCHES AFF
- M MICROPHONE OUTLET, WALL MOUNT 18-INCHES AFF
- M FLUSH FLOOR BOX WITH MICROPHONE OUTLET
- D DIRECTORS HEADSET

SAFETY

- FACP FIRE ALARM CONTROL PANEL MOUNT CENTER OF DISPLAY 54-INCHES AFF
- FAA FIRE ALARM ANNUNCIATOR PANEL MOUNT CENTER OF DISPLAY 54-INCHES AFF
- LOC LOCAL OPERATOR'S CONSOLE MOUNT CENTER OF DISPLAY 54-INCHES AFF
- NAC NOTIFICATION APPLIANCE CIRCUIT CABINET MOUNT CENTER OF DISPLAY 54-INCHES AFF
- F MANUAL FIRE ALARM PULL STATION MOUNT 42-INCHES AFF

FIRE ALARM A/V DEVICES: MOUNT 94-INCHES AFF, OR 6-INCHES BELOW CEILING, WHICHEVER IS LOWER UNO

- FIRE ALARM BELL
- FIRE ALARM HORN
- FIRE ALARM VISUAL WARNING SIGNAL
- FIRE ALARM BELL WITH VISUAL WARNING SIGNAL
- FIRE ALARM HORN WITH VISUAL WARNING SIGNAL
- MINI FIRE ALARM HORN WITH VISUAL WARNING SIGNAL
- FIRE ALARM SPEAKER WITH VISUAL WARNING SIGNAL
- FIRE ALARM SPEAKER, FLUSH IN CEILING
- FIRE ALARM SPEAKER WITH VISUAL WARNING SIGNAL, CEILING
- FIRE ALARM VISUAL WARNING SIGNAL, CEILING
- ECS SPEAKER, FLUSH IN CEILING
- ECS SPEAKER WITH VISUAL WARNING SIGNAL, CEILING
- ECS VISUAL WARNING SIGNAL, CEILING
- S SPRINKLER SYSTEMS ELECTRIC BELL ALARM
- D FIRE ALARM MAGNETIC DOOR HOLDER MOUNT 74-INCHES AFF
- L REMOTE INDICATOR LAMP
- OSY OS&Y VALVE
- FS WATER FLOW ALARM SWITCH
- TS TAMPER SWITCH
- T BEAM TRANSMITTER
- R BEAM RECEIVER
- FF FIRE FIGHTERS TELEPHONE MOUNT 54-INCHES AFF
- DAS ANTENNA
- I_D SMOKE DETECTOR - IONIZATION TYPE (D = DUCT)
- P_D SMOKE DETECTOR - PHOTOELECTRIC TYPE (D = DUCT)
- I SMOKE DETECTOR - IONIZATION TYPE
- P SMOKE DETECTOR - PHOTOELECTRIC TYPE
- HEAT DETECTOR RATE-OF-RISE AND FIXED TEMPERATURE, 135 F
- HEAT DETECTOR, RATE-OF-RISE AND FIXED TEMPERATURE, 200 F
- HEAT DETECTOR, FIXED TEMPERATURE ONLY, 135 F
- HEAT DETECTOR, FIXED TEMPERATURE ONLY, 200 F

SECURITY

INTRUSION DETECTION

- MD PIR MOTION DETECTOR
- 1 C DOOR POSITION CONTACT
- MD LR MOTION DETECTOR - LONG RANGE
- MD BR MOTION DETECTOR - BROAD RANGE
- MD 360 MOTION DETECTOR - 360 DEGREES
- GB GLASS BREAK DETECTOR
- K SECURITY KEYPAD MOUNT 48-INCHES AFF

VIDEO SURVEILLANCE

- XXX VIDEO CAMERA - CEILING
- XXX VIDEO CAMERA - WALL

ACCESS CONTROL

- XXX DOOR TAG
- ACP ACCESS CONTROL SYSTEM CONTROL PANEL
- P DOOR POSITION SWITCH
- PS POWER SUPPLY, 120V INPUT
- CR CARD READER MOUNT 36-INCHES AFF
- EL DOOR WITH ELECTRIFIED DOOR HARDWARE. REFER TO DOOR HARDWARE SPECIFICATIONS.

SINGLE-LINE DIAGRAM

XX-1 / X / XX — ENCLOSED CONTROLLER (ACROSS-THE-LINE UNO) MOUNT 60-INCHES AFF TO TOP
XX-1 = IDENTITY
X = STARTER NEMA SIZE
XX = ENCLOSURE NEMA RATING; BLANK = NEMA 1; WP = NEMA 3R

XX-1 / XX/X / XXAF / XX — ENCLOSED SWITCH; MOUNT 60-INCHES AFF TO TOP
XX-1 = IDENTITY
XX/X = AMP RATING / NO. OF POLES
XXAF = FUSE SIZE; AF=AMP FUSE; NF=NO FUSE
XX = ENCLOSURE NEMA RATING; BLANK = NEMA 1; WP = NEMA 3R

XX-1 / XX/X / XXAF / X / XX — COMBINATION CONTROLLER / DISCONNECT; MOUNT 60-INCHES AFF TO TOP
XX-1 = IDENTITY
XX/X = AMP RATING / NO. OF POLES
XXAF = FUSE SIZE; AF=AMP FUSE; NF=NO FUSE
X = STARTER NEMA SIZE
XX = ENCLOSURE NEMA RATING; BLANK=NEMA 1; WP=NEMA 3R

B XX-1 / XXX/3 / XXXX / XX — ENCLOSED CIRCUIT BREAKER; MOUNT 60-INCHES AFF TO TOP
XX-1 = IDENTITY
XXX/X = AMP RATING / NO. OF POLES
XXXX = ADJUSTABLE SETTINGS (WHERE NOTED - SEE BELOW)
XX = ENCLOSURE NEMA RATING; BLANK=NEMA 1; WP=NEMA 3R

VFD XX-1 / XXX/3 / XX — VARIABLE FREQUENCY DRIVE; MOUNT 60-INCHES AFF TO TOP
XX-1 = IDENTITY
XXX/X = AMP RATING / NO. OF POLES
XX = ENCLOSURE NEMA RATING; BLANK=NEMA 1; WP=NEMA 3R

E N XX-1 / XXX/X / XX / XXK SCCR — TRANSFER SWITCH; MOUNT 60-INCHES AFF TO TOP
XX-1 = IDENTITY
XXX/X = AMP RATING / NO. OF POLES
XX = ENCLOSURE NEMA RATING; BLANK=NEMA 1; WP=NEMA 3R

XXX/3 LSIG / XXX/3 — BREAKER / DRAW OUT BREAKER
XXX/X = AMP RATING / POLES
LSIG = ADJUSTABLE SETTINGS (WHERE NOTED)
L = LONG TIME
S = SHORT TIME
I = INSTANTANEOUS
G = GROUND FAULT PROTECTION OF EQUIPMENT
GFPE = GROUND FAULT PROTECTION OF EQUIPMENT
ERMS = ENERGY REDUCTION MAINTENANCE SWITCH

XXX/X / XXX — FUSIBLE SWITCH
XXX/X = SWITCH AMP RATING / POLES
XXX = FUSE SIZE

M XX / XX-X — MOTOR, OR MECHANICAL EQUIPMENT
XX = LOAD RATING (HP OR KVA)
XX-X = IDENTITY

M — METER, CURRENT TRANSFORMER

SPD — SURGE PROTECTION DEVICE

T / XX / XXXV / XXXYXXXV — DRY-TYPE TRANSFORMER
T = TRANSFORMER ID
XX = SIZE
XXX = PRIMARY VOLTAGE
XXXYXXV = SECONDARY VOLTAGE

TYPE, XXX / XXXYXXX VOLT / XXX AMP BUS / XXK SCCR / ROOM XXXX — SWITCHBOARD / DISTRIBUTION PANEL
TYPE, XXX = IDENTITY
XXXYXXX VOLT = VOLTAGE RATING
XXX = BUS RATING
ROOM XXXX = LOCATION

XXX / XXX / XXXY/XXXV, XPH, XW / G XXX/X — GENERATOR
XXX = IDENTITY
XXX = KW/KVA RATING
XXXYXXXV, XX, XX = VOLTAGE RATING, PHASE, WIRE
XXX/X = CB AMP RATING / NO. OF POLES

XXX / XXXYXXX V SECONDARY / XXX KVA — PAD MOUNTED OIL TYPE TRANSFORMER
XXX = IDENTITY
XXXYXXX V = SECONDARY VOLTAGE RATING
XXX = KVA / MVA RATING

GROUNDING ELECTRODE SYSTEM

SHEET INDEX

* NOTE *
ALL NOTES ON THIS SHEET ARE APPLICABLE TO ALL OTHER SHEETS IN THIS SET.
THE SYMBOLS AND ABBREVIATIONS SHOWN ON THIS SHEET MAY OR MAY NOT BE APPLICABLE IN THIS SET OF DRAWINGS.

LICENSED PROFESSIONAL ENGINEER DANIEL HOLDEN E 24792 Exp. 12/31/2025 ELECTRICAL STATE OF CALIFORNIA
4/2/2025

DLRGROUP

BATTLES BEARS

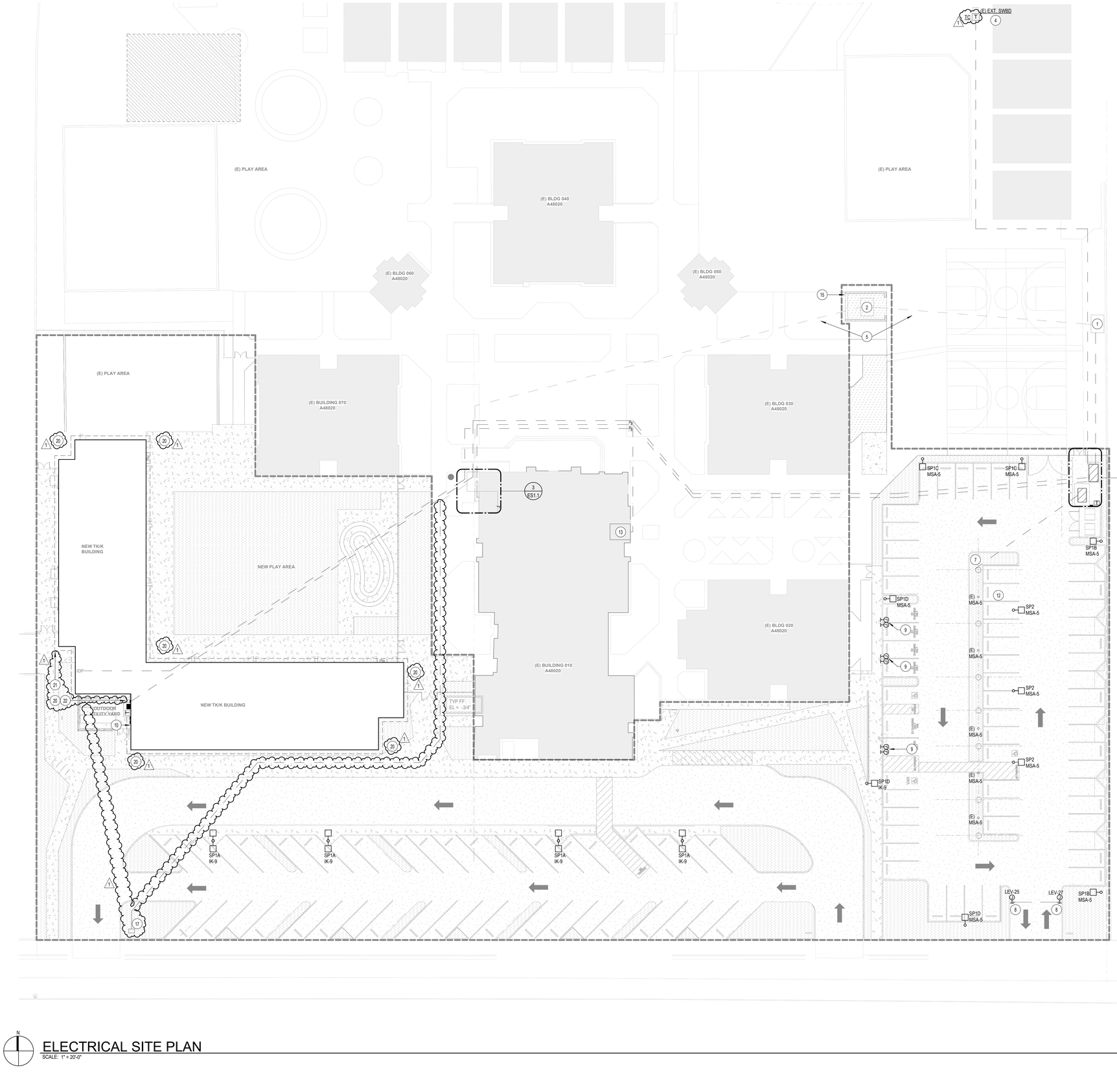
BATTLES ES - TK/K BUILDING
Santa Maria-Bonita School District
605 E Battles Rd, Santa Maria, CA 93454

CONSTRUCTION DOCUMENTS
12/16/2024
REVISIONS
ADDENDUM 1 4/3/2025

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

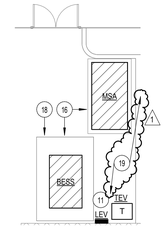
ELECTRICAL SYMBOLS, ABBREVIATIONS & NOTES

E0.1



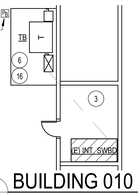
ELECTRICAL SITE PLAN

SCALE: 1" = 20'-0"



ELECTRICAL YARD

2 ES1.1 SCALE: 1/8" = 1'-0"



BUILDING 010 ELECTRICAL ROOM

3 ES1.1 SCALE: 1/8" = 1'-0"

GENERAL SITE NOTES

A SOILS ENGINEERING REPORT LISTS SOIL IN THE AREA AS MODERATELY CORROSIVE. PROVIDE ZINC-COATED GROUND RODS AT ALL GROUND ROD LOCATIONS. PROVIDE ZINC-COATED COPPER CONDUCTORS FOR ALL DIRECT-BURIED BARE GROUNDING CONDUCTORS. CONTRACTOR TO FOLLOW GEOTECHNICAL ENGINEER'S RECOMMENDATIONS FOR THE PROJECT AND PROVIDE CAST-IN-PLACE DRILLED PIER FOOTINGS FOR ALL SITE LIGHTING POLES.

ES1.1 SHEET NOTES

Keynote Number	Keynote Description
1	EXISTING UTILITY VAULT LOCATION.
2	EXISTING UTILITY TRANSFORMER TO BE REMOVED. COORDINATE WITH UTILITY.
3	EXISTING 208 VOLT SWITCHBOARD TO BE REFED. SEE SHEET ES.01. INTERCEPT EXISTING (3) 5" CONDUITS ENTERING BUILDING AND PROVIDE PULLLBOX.
4	EXISTING 480V SWITCHBOARD TO BE REFED. SEE SHEET ES.1.
5	EXISTING UTILITY FEED TO EXISTING 208V SWITCHBOARD TO BE REMOVED. COORDINATE WITH UTILITY. REMOVE EXISTING CONDUCTORS, ABANDON EXISTING UNDERGROUND CONDUITS IN PLACE. CUT AND REMOVE ANY CONDUITS LESS THAN 12" BELOW GRADE.
6	EXISTING PV EQUIPMENT YARD. REMOVE EXISTING PV EQUIPMENT. INSTALL NEW DISTRIBUTION TRANSFORMER AND DISCONNECTS PER SHEET ES.1. PROVIDE HANDHOLES FOR DATA ND FEEDER EXTENDING TO PANEL HK.
7	NEW 480 VOLT CONNECTION TO EXISTING PV SYSTEM. SEE SHEET ES.1.
8	PROVIDE 30A-2W FEEDER TO MOTORIZED GATE ARM. PROVIDE CONNECTION TO CONTROL PANEL. INTERCOM AND CARD READER. PROVIDE 1" CONDUIT WITH PULL STRING TO BUILDING 010, DATA ROOM FOR FUTURE CABLING. PROVIDE DETECTION LOOP FOR PARKING LOT EXIT.
9	PROVIDE DUAL ELECTRIC VEHICLE CHARGING STATION EQUAL TO CHARGEPOINT CPF50. PROVIDE (2) 50A-2W FEEDERS TO PANEL LEV. FEEDERS ARE SIZED FOR VOLTAGE DROP. SEE SHEET ES.1 FOR FEEDER SCHEDULE. EV CAPABLE SPACES ARE NOT REQUIRED PER 8/15/2024 PRE-APP MEETING AND IR CG-1.
10	PROVIDE PHOTOCELL AND TIMECLOCK EQUAL TO INTERMATIC ET2000 SERIES FOR CONTROL OF SITE LIGHTING. PROVIDE PELICAN WIRELESS POWER CONTROL MODULE AND ALL REQUIRED COMPONANTS TO INTEGRATE NEW LUMINAIRES WITH EXISTING PELICAN EXTERIOR LIGHTING CONTROL SYSTEM.
11	PROVIDE PHOTOCELL AND TIMECLOCK EQUAL TO INTERMATIC ET2000 SERIES FOR CONTROL OF SITE LIGHTING. MOUNT ON WALL ADJACENT PANEL LEV AND LABEL AS FED FROM MSA. PROVIDE PELICAN WIRELESS POWER CONTROL MODULE AND ALL REQUIRED COMPONANTS TO INTEGRATE NEW LUMINAIRES WITH EXISTING PELICAN EXTERIOR LIGHTING CONTROL SYSTEM.
12	EXISTING PV ARRAY, CANOPY AND UNDER-CANOPY LIGHTING INSTALLED UNDER DSA AR03-124188 TO REMAIN. INTERCEPT EXISTING LIGHTING FEED AND RECIRCUIT AS SHOWN. MOUNT NEW SP2 LUMINAIRES UNDER CANOPY AND PROVIDE SURFACE CONDUIT.
13	EXISTING DATA MDF ROOM LOCATION. PROVIDE (3) 4" CONDUITS WITH PULL STRINGS FROM EXISTING ROOM 110 TO NEW IDF ROOM 111. COORDINATE TERMINATION LOCATION WITH OWNER. PENETRATE WALL ABOVE GRADE AND PROVIDE PULL BOX ON EXTERIOR WALL. SAW CUT SIDEWALK AS REQUIRED.
14	NOT USED
15	EXISTING IRRIGATION CONTROLLERS MOUNTED ON ENCLOSURE TO BE RELOCATED TO NEW PEDESTAL APPROXIMATELY 10' TO THE NORTH. EXTEND EXISTING CONDUIT AND PULL NEW 20A-2W CONDUCTORS TO EXISTING CIRCUIT IN BUILDING 030.
16	PROVIDE PAD PER LE6.2
17	PROVIDE 2" CONDUIT WITH PULL STRING, MINIMUM 48" BELOW GRADE, FROM EXISTING FIBER OPTIC VAULT AT STREET TO EXISTING ADMIN BUILDING ENTRY POINT. INTERCEPT EXISTING CONDUIT AT ENTRY POINT. COORDINATE NEW FIBER OPTIC SERVICE ENTRANCE BY OWNER'S VENDER. EXISTING SERVICE CONDUIT CROSSING NEW BUILDING FOOTPRINT TO BE DEMOLISHED/ABANDONED.
18	PROVIDE CODE-REQUIRED LABELING ON BESS INCLUDING BUT NOT LIMITED TO "BATTERY STORAGE SYSTEM" "LITHIUM ION IRON PHOSPHATE" "ENERGIZED ELECTRICAL CIRCUITS" AND CONTACT INFORMATION, INCLUDING PHONE NUMBER, FOR SERVICE PERSONNEL AND TRAINED FIRE MITIGATION PERSONNEL. SEE SIGNAGE DETAIL 4/ASZ.3.
19	PROVIDE GROUND WELL PER DETAIL 7/E6.1 AT MSA AND AT TEV. PROVIDE #2 AWG BARE COPPER GROUNDING CONDUCTOR BETWEEN GROUND WELLS, MINIMUM 24" BELOW GRADE.
20	PROVIDE GROUND WELL PER DETAIL 7/E6.1.
21	PROVIDE #2 AWG BARE COPPER GROUNDING LOOP AROUND BUILDING, MINIMUM 24" BELOW GRADE. SEE DETAIL 4/E6.1.
22	PROVIDE CONCRETE ENCASED ELECTRODE WITH CADWELD CONNECTION TO FOUNDATION STEEL. SEE DETAIL 4/E6.1.

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BATTLES BEARS

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DSA App: 03-124614
DSA File No: 42-48
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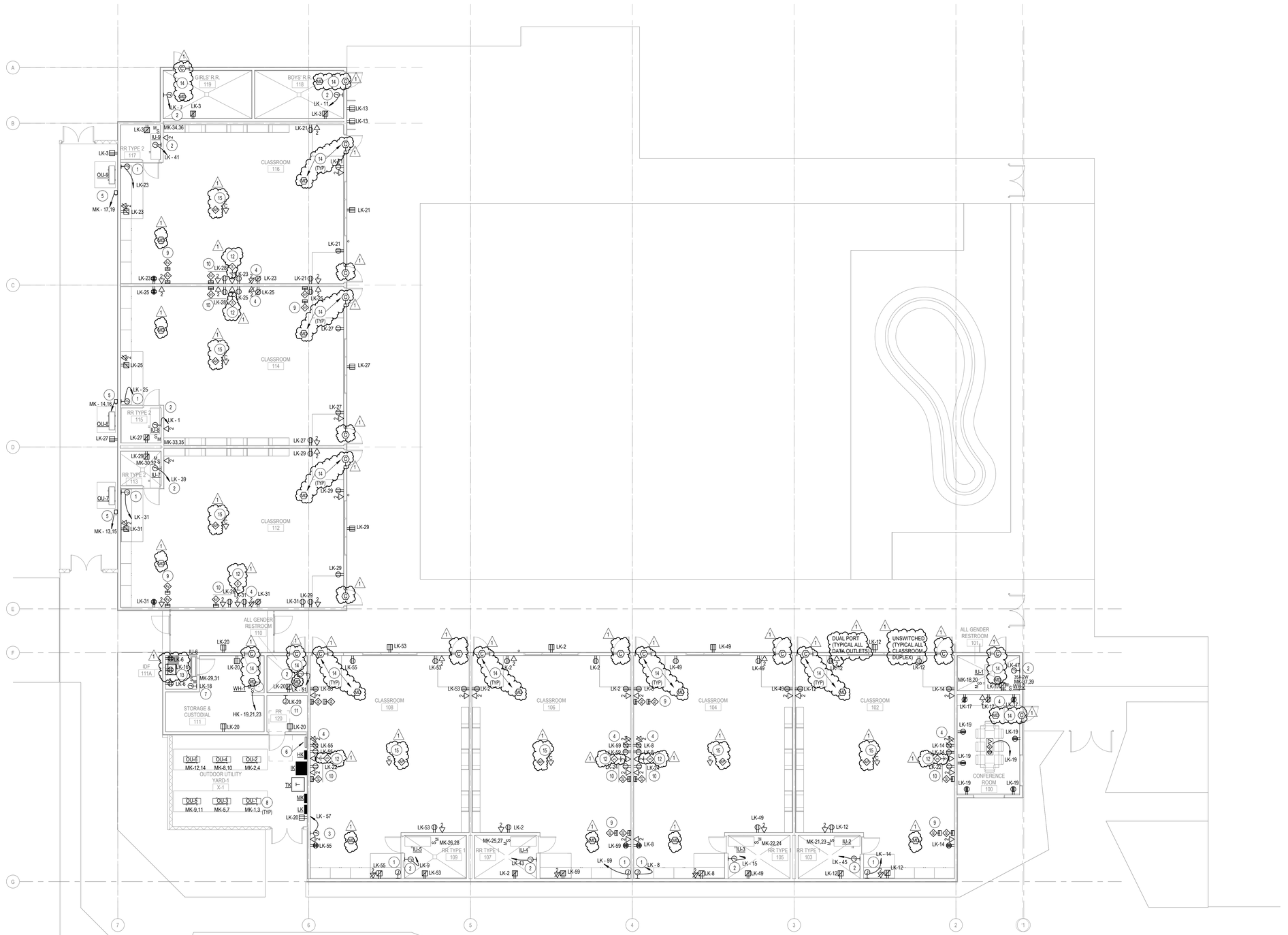
ELECTRICAL SITE PLAN

ES1.1



POWER AND SYSTEMS PLAN

SCALE: 1/8" = 1'-0"

GENERAL POWER NOTES

(TYPICAL ALL POWER SHEETS)

1. EACH BIDDER SHALL VISIT THE SITE DURING THE BID PERIOD TO FAMILIARIZE HIM/HERSELF WITH EXISTING CONDITIONS RELATIVE TO THE SCOPE OF WORK AS INDICATED ON THE BID DOCUMENTS. THE BIDDER SHALL NOTIFY THE ARCHITECT FOR ANY VARIATION BETWEEN DESIGN INTENT AS SHOWN ON THE BID DOCUMENTS AND EXISTING CONDITIONS OBSERVED IN THE FIELD. OBSERVED DISCREPANCIES BETWEEN THE CONTRACT DOCUMENTS AND EXISTING FIELD CONDITIONS SHALL BE SUBMITTED IN WRITING BY THE DEADLINE FOR QUESTIONS, PRIOR TO ISSUANCE OF THE FINAL ADDENDUM TO ALL BIDDERS. FAILURE TO SUBMIT SHALL NOT RELIEVE THE CONTRACTOR OF ITS RESPONSIBILITY TO PROVIDE COMPLETE FUNCTIONAL SYSTEM AS INDICATED OR INFERRED BY THE CONTRACT DOCUMENTS. CONTRACTOR TO PROVIDE ALL REQUIRED LABOR, PARTS AND MATERIAL TO ATTAIN DESIGN INTENT.
2. VERIFY ANY NEUTRAL WIRES REQUIRED ON 1Ø OR 3Ø MECHANICAL UNITS FURNISHED UNDER DIVISION 23. IF REQUIRED, PROVIDE NEUTRAL.
3. PROVIDE DEDICATED 120-VOLT CIRCUITS TO ALL HVAC BAS CONTROL DEVICES AND PANELS. COORDINATE QUANTITY WITH DIVISION 23. UTILIZE NEAREST SPARE 120-VOLT, 20/1 BREAKER. LABEL TYPED PANEL DIRECTORY ACCORDING TO LOAD BEING SERVED.
4. IN ADDITION TO DEVICES SHOWN, SEE SCHEDULE SHEETS FOR CONNECTIONS TO ALL MECHANICAL EQUIPMENT.
5. LOCATE SWITCHES FOR CONTROL OF FANS IN TWO-GANG BOX WITH LIGHT SWITCH WHERE APPLICABLE.
6. PROVIDE #10AWG CONDUCTORS FOR ALL WARM AIR DRYER CIRCUITS. PROVIDE LOCKOUT DEVICE AT ALL BREAKERS SERVING WARM AIR DRYERS.
7. SEE SHEET E5.1 FOR FEEDER SIZE SCHEDULE.
8. CONTRACTOR TO COORDINATE WITH ARCHITECTURAL, MECHANICAL, PLUMBING, A/V, TELE COMMUNICATION DRAWINGS AND ELEVATIONS PRIOR TO ELECTRICAL ROUGH-INS. CONTRACTOR TO FIELD COORDINATE WITH EQUIPMENT VENDOR FOR ELECTRICAL CONNECTION TYPE. CONTRACTOR TO MAKE NECESSARY ADJUSTMENTS PER EQUIPMENT PRODUCT DATA SHEETS.
9. ELECTRICAL PLANS ARE MADE TO PROVIDE DESIGN INTENT. CONTRACTOR TO FIELD COORDINATE CONDUIT ROUTING TO BEST SUITE THE PROJECT IN COORDINATION WITH OTHER TRADES. PROVIDE ADJUSTMENT AS REQUIRED TO MEET DESIGN INTENT.
10. ELECTRICAL WORK SHOWN ON THESE PLANS ARE NEW EXCEPT NOTED OTHERWISE.
11. JUNCTION BOXES FOR POWER AND ALL LOW VOLTAGE SYSTEMS TO BE PROVIDED WITH SOUND PADS. JUNCTION BOXES SHALL BE AT LEAST 6" ON CENTERS SIDE-TO-SIDE OR BACK-TO-BACK.
12. WHERE SWITCHED DUPLEX RECEPTACLES ARE SHOWN, BOTTOM RECEPTACLE IS TO BE CONTROLLED WITH AREA LIGHTING FOR PLUG LOAD CONTROL. TOP RECEPTACLE TO BE UNSWITCHED. LABEL OUTLETS PER CODE. SEE SHEET E1.1 FOR OCCUPANCY SENSOR CONTROL.
13. WHERE SWITCHED FOURPLEX RECEPTACLES ARE SHOWN, RIGHT DUPLEX RECEPTACLE IS TO BE CONTROLLED WITH AREA LIGHTING FOR PLUG LOAD CONTROL. LEFT DUPLEX RECEPTACLE TO BE UNSWITCHED. LABEL OUTLETS PER CODE. SEE SHEET E1.1 FOR OCCUPANCY SENSOR CONTROL.
14. AT EACH DATA LOCATION SHOWN, PROVIDE ASSEMBLY PER DETAIL 21/E6.2. DEVICE PER DETAIL 22/E6.2, AND CAT 6A CABLING TO IDF.

/1

E2.1 SHEET NOTES

Keynote Number	Keynote Description
1	PROVIDE CONNECTION TO MOTORIZED WINDOW SHADE VIA LIGHTING CONTROL SYSTEM. SEE ARCHITECTURAL FINISH SCHEDULE.
2	PROVIDE DEDICATED CIRCUIT TO HAND DRYER PER DYSON AIRBLADE V SPECS.
3	PROVIDE DEDICATED CIRCUIT FOR ASSISTED LISTENING SYSTEM.
4	PROVIDE WALL BOX WITH INTEGRAL SURGE PROTECTOR, CHIEF PAC-526 OR APPROVED EQUAL, FOR WALL-MOUNTED DISPLAY. MOUNTER CENTER OF BOX AT 54" AFF. PROVIDE 1" CONDUIT TO ACCESSIBLE CEILING SPACE FOR LOW-VOLTAGE CONNECTION BY OWNER'S VENDOR. CONFIRM EXACT LAYOUT OF TEACHING WALL WITH OWNER PRIOR TO ROUGH-IN.
5	PROVIDE 60A DISCONNECT, FUSED PER EQUIPMENT MANUFACTURER REQUIREMENTS. PROVIDE 50A-2W FEEDER TO CIRCUIT INDICATED.
6	PROVIDE GROUND BUS BAR PER DETAIL 3/E6.1
7	PROVIDE CONNECTION TO FIRE ALARM CONTROL PANEL.
8	PROVIDE 50A-2W FEEDER TO CIRCUIT INDICATED. TYPICAL OF (6) UNITS.
9	PROVIDE 4" SQUARE JUNCTION BOXES WITH MUDRINGS AT 18" AFF AND 48" AFF FOR AV EQUIPMENT CABLING. PROVIDE 1" CONDUIT TO ACCESSIBLE CEILING SPACE. CONFIRM EXACT LAYOUT OF TEACHING WALL WITH OWNER PRIOR TO ROUGH-IN.
10	PROVIDE RECEPTACLE, DATA OUTLET AND JUNCTION BOX FOR AV (WITH 1" CONDUIT) HIGH ON WALL FOR WALL-MOUNTED PROJECTOR. CONFIRM MOUNTING HEIGHT AND EXACT LAYOUT OF TEACHING WALL WITH OWNER PRIOR TO ROUGH-IN.
11	PROVIDE CONNECTION TO ELECTRONIC TRAP PRIMER. CONNECTION TO BE FROM LINE SIDE OF ROOM'S RECEPTACLE.
12	PROVIDE RECESSED COMBINATION CLOCK/ SPEAKER SYSTEM EQUAL TO BOGEN NYQUIST NQ-21810WBC. MOUNT CENTER OF SPEAKER AT 74" AFF. PROVIDE 1" CONDUIT TO ACCESSIBLE CEILING SPACE AND CABLING TO IDF ROOM 111A.
13	PROVIDE WALL-MOUNTED CABINET EQUAL TO CPI CUBE-IT 1196-X36. SEE SHEET E6.4 FOR ATTACHMENT DETAIL. PROVIDE NETWORK SWITCH, PATCH PANEL AND TERMINATIONS. PROVIDE FIBER OPTIC PATCH PANEL AND CONNECTION TO ADMIN BUILDING MDF.
14	PROVIDE COMPONENTS TO MATCH EXISTING CAMPUS INTRUSTION PROTECTION SYSTEM, MANUFACTURED BY DIGITAL MONITORING PRODUCTS. PROVIDE DOOR CONTACT (DMP 1076G) AND DUAL TECHNOLOGY MOTION SENSOR (DMP XX-08). PROVIDE 3/4" CONDUIT TO ACCESSIBLE CEILING SPACE AND CABLING (FALCON WIRE #590422R OR APPROVED EQUAL) TO EXISTING SECURITY PANEL IN ADMIN BUILDING ENTRANCE CORRIDOR.
15	PROVIDE WIRELESS ACCESS POINT AND CEILING-MOUNTED DATA OUTLET FOR FUTURE PROJECTOR.

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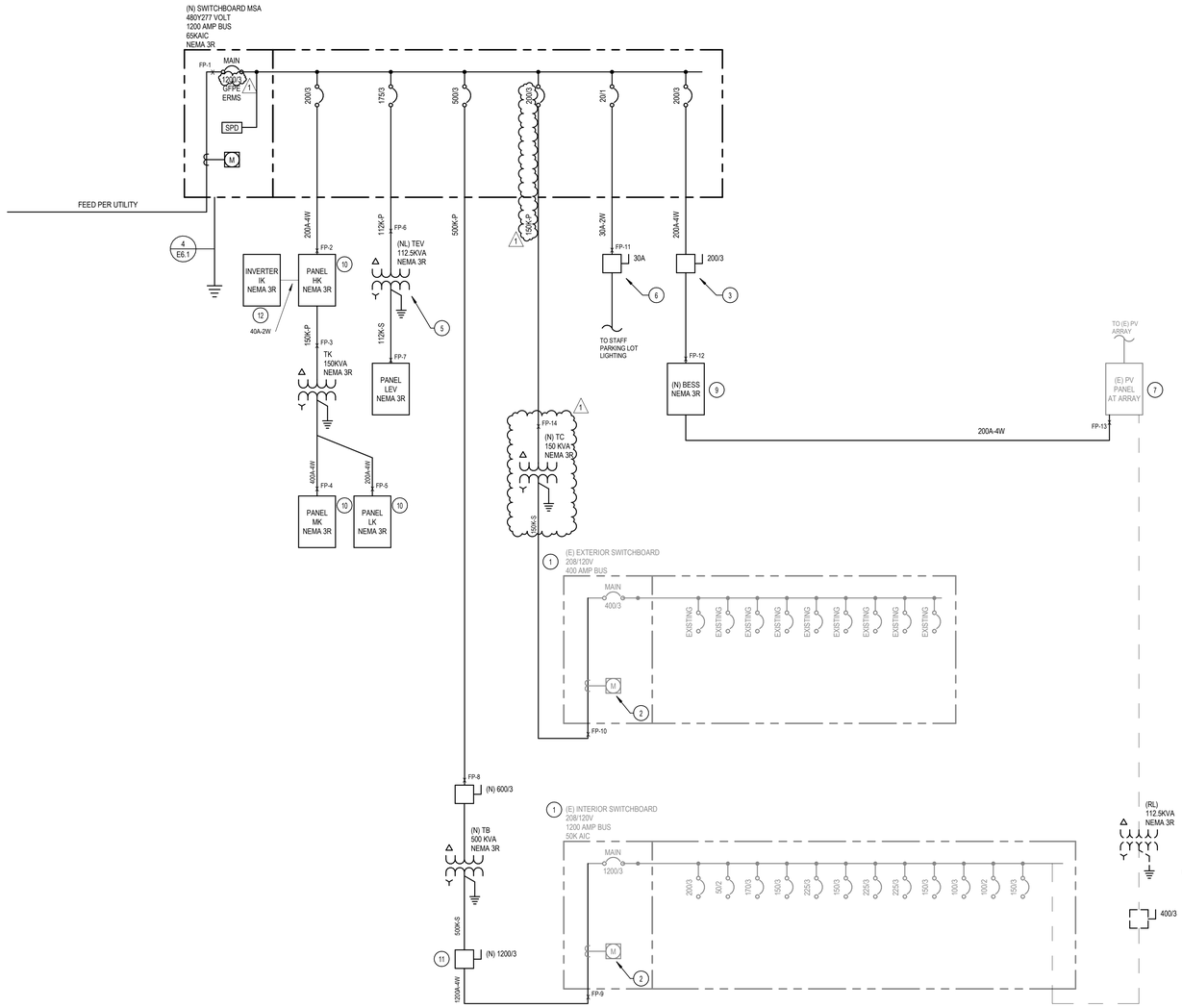
/1 POWER AND SYSTEMS PLAN

E2.1



1 E5.1 ONE-LINE DIAGRAM
NO SCALE

FAULT POINT	FROM	TO	Voltage	No. of Parallel Feeds	No. of Phase & Neutral Conductors per Raceway	Phase & Neutral Conductor Size (AWG)	Single Phase or Three Phase Feeder	Feeder Length	% Voltage Drop	Available Fault at Source	Available Fault at load
1	UTILITY XFMR	MSA	480	4	4	600 MCM	3	75	0.11%	65,000	65,000
2	MSA	HK	480	2	4	250 MCM	3	545	0.65%	65,000	12,456
3	HK	TK	480	1	4	250 MCM	3	5	0.03%	12,456	12,274
4	TK	MK	208	1	4	600 MCM	3	5	0.08%	8,317	3,623
5	TK	LK	208	1	4	3/0 AWG	3	10	0.16%	8,317	8,055
6	MSA	TEV	480	1	4	2/0 AWG	3	20	0.14%	65,000	45,109
7	TEV	LEV	208	1	4	500 MCM	3	5	0.07%	6,238	6,238
8	MSA	TB	480	2	4	350 MCM	3	345	0.82%	65,000	21,502
9	TB	(E) INT SWBD	208	1	3	1/0 AWG	3	15	0.24%	27,722	23,423
10	TC	(E) EXT SWBD	208	2	4	250 MCM	3	5	0.03%	8,317	8,134
11	MSA	STAFF LOT LTG	277	1	2	10 AWG	1	40	0.64%	65,000	29,724
12	MSA	BESS	480	1	4	3/0 AWG	3	20	0.13%	65,000	10,552
13	BESS	(E) PV PANEL	480	1	4	3/0 AWG	3	75	0.48%	10,552	8,433
14	MSA	TC	480	1	4	250 MCM	3	240	1.14%	65,000	10,918

SWITCHBOARD: MSA

LOCATION
BUS RATING 1200.0 A
MAIN BREAKER 1200 A

VOLTAGE: 480Y/277
PHASES: 3
WIRES: 4
SCCR: 65KAIC

CKT	CIRCUIT DESCRIPTION	BKR TRIP	P	BKR TYPE	LOAD TYPE	LOAD (kVA)	NOTES
1	HK	400.0 A	3		Spare; ...	133	
2	TEV	175.0 A	3		Spare; ...	43	
3	TB	500.0 A	3		O	129	
4	(E) EXT. SWBD	400.0 A	3		O	65	
5	STAFF LOT LIGHTING	20.0 A	1		L	1	
6	BESS	200.0 A	3		O	0	
7	SPACE ONLY	--	1		--	--	
8	SPACE ONLY	--	1		--	--	
					TOTAL LOAD:	370 kVA	
					TOTAL AMPS:	445 A	

LOAD TYPE	LOAD DESCRIPTION	CONNECTED LOAD (VA)	DEMAND FACTOR	ESTIMATED DEMAND (VA)	DEMAND FACTOR NOTES	BKR TYPE	PANEL TOTALS
L	LIGHTING	7821 VA	125.00%	9777 VA	CONTINUOUS LOAD @ 125%	G = GFCI (5mA)	
R	RECEPTACLES	19080 VA	76.21%	14540 VA	FIRST 10KVA @ 100%, REMAINDER @ 50%	GP = GFCI (30mA)	**CONNECTED LOAD:** 370 kVA
K	KITCHEN	0 VA	0.00%	0 VA	NON-DWELLING KITCHEN EQUIPMENT, NEC ART. 220	ST = SHUNT TRIP	**ESTIMATED DEMAND:** 369 kVA
M	MOTOR	96369 VA	102.01%	97283 VA	LARGEST MOTOR, NEC ART. 430	LO = LOCK OUT	**CONNECTED CURRENT:** 445 A
C	COOLING	0 VA	0.00%	0 VA			**EMD CURRENT:** 443.9 A
H	HEATING	0 VA	0.00%	0 VA			
O	OTHER	247453 VA	100.00%	247453 VA			
Spare	SPARE	0 VA	0.00%	0 VA			

NOTES:

8

GENERAL SINGLE LINE NOTES

1. OVERCURRENT DEVICES OF ENTIRE DISTRIBUTION SYSTEM SHALL MEET STATED FAULT CURRENT VALUES WITH FULLY RATED EQUIPMENT.
2. CONDUCTOR LENGTHS INDICATED ON THE SINGLE LINE DIAGRAM ARE FOR FAULT CURRENT CALCULATIONS ONLY. ACTUAL LENGTH SHALL BE DETERMINED BY FIELD CONDITIONS AND ACTUAL ROUTES OF FEEDERS.
3. REFER TO SWITCHBOARD SCHEDULES AND DISTRIBUTION PANEL SCHEDULES FOR ADDITIONAL REQUIREMENTS. WHERE A DISCREPANCY EXISTS BETWEEN EQUIPMENT ON THE SINGLE LINE DIAGRAM AND THE DETAILED SCHEDULES, THE ITEM OR ARRANGEMENT WITH BETTER QUALITY, GREATER QUANTITY, OR HIGHER COST SHALL BE USED.
4. ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
5. REFER TO THE MOTOR AND SPECIAL CONNECTION SCHEDULE FOR ALL FEEDERS DESIGNATED "EQ".
6. GROUNDING ELECTRODE CONDUCTORS SIZES ARE NOT INDICATED ON THE SINGLE LINE DIAGRAM. REFER TO THE GROUNDING RISER DIAGRAM FOR CONNECTIONS AND CONDUCTOR SIZES.

E5.1 SHEET NOTES

Keynote Number	Keynote Description
1	EXISTING SWITCHBOARD TO REMAIN AND BE REFED FROM NEW 480/277V SWITCHBOARD.
2	REMOVE EXISTING MAIN BONDING JUMPER BETWEEN GROUND/NEUTRAL AT EXISTING SERVICE TO BE REFED. EXISTING METER TO BE REMOVED. COORDINATE WITH UTILITY.
3	NEW RULE 21 LOCKABLE DISCONNECT, LABELED PER CALIFORNIA ELECTRICAL CODE SECTION 706.
4	EXISTING PV SYSTEM INTERCONNECTION TO BE REMOVED FROM SWITCHBOARD. EXISTING 112.5 KVA TRANSFORMER TO BE REMOVED AND REUSED.
5	EXISTING TRANSFORMER INSTALLED UNDER PV ARRAY PROJECT TO BE RELOCATED AND REUSED AS TRANSFORMER TEV. UPDATE PRIMARY/SECONDARY LABELING.
6	PROVIDE 30A/2P FUSIBLE DISCONNECT WITH 14 KAIC CURRENT LIMITING FUSES.
7	PHOTOVOLTAIC ARRAY FOR THIS PROJECT INSTALLED UNDER DSA AR/3-124188 PER 8/15/2024 PRE-APP MEETING.
8	EXISTING CAMPUS LOADS INCLUDED USING 12 MONTH PEAK UTILITY DEMAND INFORMATION, INCLUDING POWER FACTOR CORRECTION AND 125% DEMAND FACTOR PER CALIFORNIA ELECTRICAL CODE SECTION 220.87.
9	PROVIDE DELEGATE DESIGN/DEFERRED SUBMITTAL BATTERY ENERGY STORAGE SYSTEM PER SPEC SECTION 263373. SYSTEM TO INCLUDE 7' X 4' OUTDOOR NEAR EXPOSURE ENCLOSURE WITH FIRE DETECTION AND SUPPRESSION. SCHNEIDER ELECTRIC BESS 90kW 225KWH IP54 OR APPROVED EQUAL. BESS ENCLOSURE TO BE MINIMUM 10' FROM LOT LINE (SEE ES1.1).
10	PROVIDE METERING FOR THIS PANEL FOR LOAD DISAGGREGATION PER CALIFORNIA ENERGEY CODE SECTION 130.5. PROVIDE METERS WITH INTERNAL DATA STORAGE AND DISPLAY.
11	PROVIDE NEW 1200A/3P FUSIBLE DISCONNECT.
12	PROVIDE LIGHTING INVERTER EQUAL TO MYERS CR SERIES.

BRANCH CIRCUIT & FEEDER SCHEDULE - COPPER

MARK (AMPS)	# SETS	Ø & N	GND	CONDUIT SIZE MARK SUFFIX -4W	-3W	-2W
15	1	12	12	3/4"	3/4"	3/4"
20	1	12	12	3/4"	3/4"	3/4"
25	1	10	10	3/4"	3/4"	3/4"
30	1	10	10	3/4"	3/4"	3/4"
35	1	8	10	3/4"	3/4"	3/4"
40	1	8	10	3/4"	3/4"	3/4"
45	1	6	10	1"	3/4"	3/4"
50	1	6	10	1"	3/4"	3/4"
60	1	4	10	1-1/4"	1"	3/4"
70	1	4	8	1-1/4"	1"	3/4"
80	1	3	8	1-1/4"	1-1/4"	1"
90	1	2	8	1-1/4"	1-1/4"	1"
100	1	1	8	1-1/2"	1-1/2"	1-1/4"
110	1	1	6	1-1/2"	1-1/2"	1-1/4"
125	1	1	6	1-1/2"	1-1/2"	1-1/4"
150	1	1/0	6	2"	1-1/2"	1-1/4"
175	1	2/0	6	2"	1-1/2"	1-1/4"
200	1	3/0	6	2"	2"	1-1/2"
225	1	4/0	4	2-1/2"	2"	1-1/2"
250	1	250	4	2-1/2"	2"	1-1/2"
300	1	350	4	3"	2-1/2"	2"
350	1	500	3	3-1/2"	3"	2-1/2"
400	1	600	3	3-1/2"	3"	2-1/2"
400	2	3/0	3	2"	2"	1-1/2"
450	2	4/0	2	2-1/2"	2"	1-1/2"
500	2	250	2	2-1/2"	2-1/2"	2"
600	2	350	1	3"	2-1/2"	2"
700	2	500	1/0	3-1/2"	3"	2-1/2"
800	2	600	1/0	3-1/2"	3"	2-1/2"
1000	3	400	2/0	3"	3"	2-1/2"
1200	3	600	3/0	3-1/2"	3-1/2"	3"
1600	4	600	4/0	3-1/2"	3-1/2"	3"
2000	5	600	250	4"	3-1/2"	3"
2500	6	600	350	4"	3-1/2"	3"
3000	8	500	400	3-1/2"	3"	2-1/2"
4000	10	600	500	4"	3-1/2"	3"

ABBREVIATIONS:

Ø PHASE
N NEUTRAL
GND EQUIPMENT GROUNDING CONDUCTOR
-4W FOUR WIRE + GROUND (3Ø,N,GND)
-3W THREE WIRE + GROUND (3Ø,GND or 2Ø,N,GND)
-2W TWO WIRE + GROUND

3-PHASE TRANSFORMER PRIMARY AND SECONDARY SCHEDULE - COPPER

XFMR KVA	PRIMARY MARK	AMPS	# SETS	Ø	GND	C	SECONDARY MARK	AMPS	# SETS	Ø & N	BJ	C
15	15K-P	25	1	10	10	3/4"	15K-S	50	1	6	8	1"
30	30K-P	50	1	6	10	3/4"	30K-S	100	1	1	6	1-1/2"
45	45K-P	70	1	4	8	1"	45K-S	150	1	1/0	6	2"
75	75K-P	150	1	1/0	6	1-1/2"	75K-S	225	1	4/0	2	2-1/2"
112.5	112K-P	175	1	2/0	6	1-1/2"	112K-S	350	1	500	1/0	3-1/2"
150	150K-P	250	1	250	4	2"	150K-S	500	2	250	1/0	2-1/2"
225	225K-P	350	1	500	3	3"	225K-S	700	2	500	2/0	3-1/2"
300	300K-P	500	2	250	2	2-1/2"	300K-S	1000	3	400	3/0	3"
500	500K-P	600	2	350	1	3"	500K-S	1200	3	600	3/0	3-1/2"

ABBREVIATIONS:

Ø PHASE
BJ BONDING JUMPER
C CONDUIT SIZE
N NEUTRAL
GND EQUIPMENT GROUNDING CONDUCTOR
-P PRIMARY - THREE WIRE + GROUND (3Ø,GND)
-S SECONDARY - FOUR WIRE + BONDING JUMPER (3Ø, N, BJ)

NOTES:

1. CONDUCTOR AMPACITIES ARE BASED ON NEC TABLE 310.15(B)(16).
2. CONDUIT SIZES ARE BASED ON A MAXIMUM FILL RATIO OF 40%.
3. SCHEDULE SHALL BE USED FOR TRANSFORMERS WITH THE FOLLOWING CONFIGURATION: 480 V DELTA PRIMARY AND 208Y/120 V SECONDARY.
4. ALL FEEDERS TO TRANSFORMERS SHALL INCLUDE AN EQUIPMENT GROUNDING CONDUCTOR.
5. SCHEDULE IS VALID FOR TYPE THHN, THWN-2, AND XHHW-2 CONDUCTORS. SEE SPECIFICATIONS FOR CONDUCTOR TYPES REQUIRED.
6. SCHEDULE IS VALID FOR TYPE EMT, IMC, FMC, LFMC, HDPE, AND RNC-40 RACEWAYS. SEE SPECIFICATIONS FOR RACEWAY APPLICATIONS.
7. NOT ALL SIZES USED.

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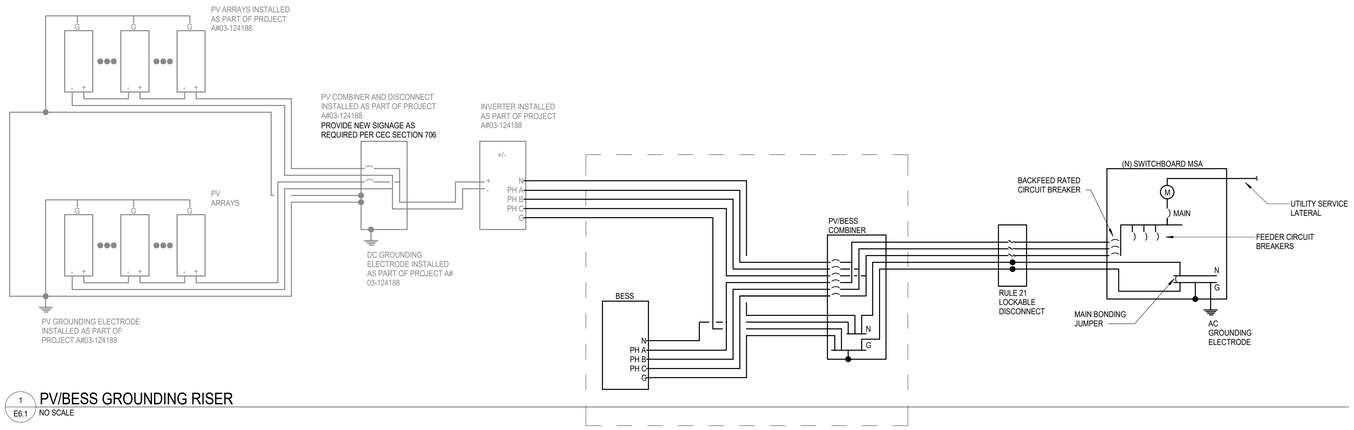
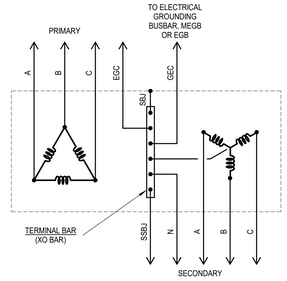
ELECTRICAL DIAGRAMS

E5.1



1 E6.1 PV/BESS GROUNDING RISER
NO SCALE



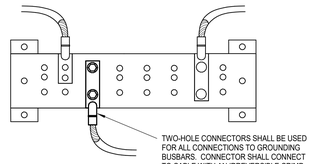
ABBREVIATIONS

A	PHASE A
B	PHASE B
C	PHASE C
N	NEUTRAL
EGC	EQUIPMENT GROUNDING CONDUCTOR
SSBJ	SUPPLY SIDE BONDING JUMPER
SBJ	SYSTEM BONDING JUMPER

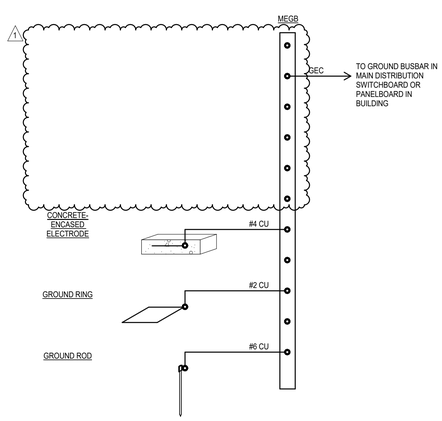
NOTES

1. PROVIDE SYSTEM BONDING JUMPER AT TRANSFORMER AS INDICATED ON THIS DETAIL. DO NOT BOND NEUTRAL-GROUND AT LOAD SIDE PANELBOARD OR DISCONNECT.
2. SEE ONE-LINE DIAGRAM AND FEEDER SCHEDULES FOR SIZING OF FEEDER CONDUCTORS INCLUDING BJ.
3. BJ AND SBJ SHALL BE SIZED PER NEC TABLE 250.102(C)(1)
4. EGC SHALL BE SIZED PER NEC TABLE 250.122.

2 E6.1 TRANSFORMER GROUNDING
NO SCALE



3 E6.1 GROUNDING BUSBAR CONNECTIONS
NO SCALE



BUILDING / STRUCTURE GROUNDING NOTES:

1. PROVIDE A GROUNDING ELECTRODE SYSTEM FOR EACH BUILDING. REFER TO ARCHITECTURAL CODE PLAN FOR DEFINITION OF BUILDINGS.
2. BOND ALL GROUNDING ELECTRODES AS DEFINED IN NEC 250.52 THAT ARE PRESENT IN EACH BUILDING TO THE MAIN ELECTRICAL GROUNDING BUSBAR, MEGB, SERVING EACH BUILDING. COMMON ELECTRODES ARE INDICATED ON THIS RISER. OTHERS MAY BE PRESENT. PROVIDE ELECTRODES AS NOTED BELOW.
3. METAL UNDERGROUND WATER PIPE
   REF NEC 250.52(A)(1). IF PRESENT IN BUILDING, BOND TO MEGB. SEE TABLE FOR GROUNDING ELECTRODE CONDUCTOR SIZE. PROVIDE BONDING JUMPER ACROSS WATER METER.
4. METAL FRAME OF BUILDING OR STRUCTURE
   REF NEC 250.52(A)(2) OR REF NEC 250.104(C) IF METAL FRAME DOES NOT QUALIFY AS AN ELECTRODE. IF PRESENT IN BUILDING, BOND TO MEGB. SEE TABLE FOR GROUNDING ELECTRODE CONDUCTOR (OR BONDING CONDUCTOR) SIZE.
5. CONCRETE ENCASED ELECTRODE
   REF NEC 250.52(A)(3) PROVIDE 20-FT OF BARE #4 CU AT BOTTOM OF CONCRETE BLDG FOOTING. BOND TO MEGB. GROUNDING ELECTRODE CONDUCTOR SIZE SHALL BE #4 CU.
6. GROUND RING
   REF NEC 250.52(A)(4) PROVIDE #2 BARE CU 30-INCHES DEEP MIN. IN DIRECT CONTACT WITH THE EARTH AND ENCIRCLING THE BUILDING. BOND TO MEGB. GROUNDING ELECTRODE CONDUCTOR SIZE SHALL BE #2 CU.
7. GROUND ROD
   REF NEC 250.52(A)(5) PROVIDE GROUND ROD. BOND TO MEGB. GROUNDING ELECTRODE CONDUCTOR SIZE SHALL BE #6 CU. SEE 7/E6.1
8. METAL GAS PIPE
   REF NEC 250.104(B) IF PRESENT IN BUILDING, BOND TO MEGB. SIZE PER TABLE 250.122

GROUNDING ELECTRODE CONDUCTOR SIZING (NEC 250.66)

SIZE OF LARGEST UNGROUNDED SERVICE CONDUCTOR OR EQUIVALENT AREA FOR PARALLEL CONDUCTORS (AWG/KCMIL)		GROUNDING ELECTRODE SIZE (GEC)
COPPER	ALUMINUM	
#2 OR SMALLER	#1/0 OR SMALLER	#8 CU IN 3/4" C.
#1 OR #1/0	#2/0 OR #3/0	#6 CU IN 3/4" C.
#2/0 OR #3/0	#4/0 OR 250	#4 CU IN 3/4" C.
OVER #3/0 THROUGH 350	OVER 250 THROUGH 500	#2 CU IN 3/4" C.
OVER 350 THROUGH 600	OVER 500 THROUGH 900	#1/0 CU IN 3/4" C.
OVER 600 THROUGH 1100	OVER 900 THROUGH 1750	#2/0 CU IN 3/4" C.
OVER 1100	OVER 1750	#3/0 CU IN 1" C.

4 E6.1 BUILDING OR STRUCTURE GROUNDING
NO SCALE

SWITCHBOARD SES-A
277/480V, 3Ø, 4W

480/277 VOLT COLORS:

PHASE A: BROWN

PHASE B: ORANGE

PHASE C: YELLOW

NEUTRAL: GRAY

GROUND: GREEN

SWITCHBOARD LABEL EXAMPLE:
CONTENT AND CONFIGURATION REQUIRED

PANEL L1A1
120/208V, 3Ø, 4W
FED FROM T1A1

208/120 VOLT COLORS:

PHASE A: BLACK

PHASE B: RED

PHASE C: BLUE

NEUTRAL: WHITE

GROUND: GREEN

DISTRIBUTION PANELBOARD, PANELBOARD LABEL EXAMPLE: CONTENT AND CONFIGURATION REQUIRED

XFMR T1A1
480V DELTA - 208Y/120V
FED FROM SES

TRANFORMER LABEL EXAMPLE:
CONTENT AND CONFIGURATION REQUIRED

208V, 3Ø, 4W
FED FROM XFMR T1A1
FEEDS PANEL L1A1

SAFETY SWITCH OR CIRCUIT BREAKER ENCLOSURE EXAMPLE:
CONTENT AND CONFIGURATION REQUIRED

ROOFTOP UNIT RTU-1

SWITCHBOARD AND DISTRIBUTION PANEL EXAMPLE:
CONTENT AND CONFIGURATION REQUIRED

PANEL L1A1

SUB-FEED BREAKERS LOCATED IN BRANCH PANELS EXAMPLE:
CONTENT AND CONFIGURATION REQUIRED

EQUIPMENT LABELING DETAIL GENERAL NOTES:

A. LABEL SHALL BE BLACK OR WHITE LAMINATED ACRYLIC OR MELAMINE WITH ENGRAVED LETTERING AND SELF-ADHESIVE BACK.

B. LETTERING SHALL BE WHITE ON BLACK OR BLACK ON WHITE BACKGROUND AND 3/8-INCH HIGH MINIMUM.

C. PROVIDE THE FOLLOWING INFORMATION ON SWITCHBOARD LABELS:
   SWITCHBOARD TAG
   SYSTEM VOLTAGE, PHASE, WIRE
   SHORT CIRCUIT RATING, DATE
   CONDUCTOR COLORS

D. PROVIDE THE FOLLOWING INFORMATION ON DISTRIBUTION PANELBOARD AND PANELBOARD LABELS:
   DISTRIBUTION PANELBOARD OR PANELBOARD TAG
   SYSTEM VOLTAGE, PHASE, WIRE
   FED FROM
   SHORT CIRCUIT RATING, DATE
   CONDUCTOR COLORS

E. PROVIDE THE FOLLOWING INFORMATION ON TRANSFORMER LABELS:
   TRANSFORMER TAG
   SYSTEM PRIMARY AND SECONDARY VOLTAGE, WYE, DELTA, OR SINGLE PHASE
   FED FROM

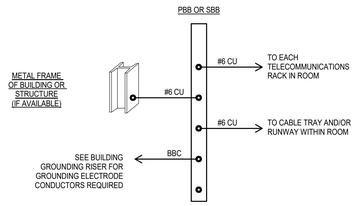
F. PROVIDE THE FOLLOWING INFORMATION ON SAFETY SWITCH OR CIRCUIT BREAKER ENCLOSURE LABELS:
   SYSTEM VOLTAGE, PHASE, WIRE
   FED FROM
   FEEDS (LOAD BEING SERVED)

G. PROVIDE THE FOLLOWING INFORMATION AT INDIVIDUAL SWITCHBOARD AND DISTRIBUTION PANELBOARD BRANCH SWITCHES:
   BRANCH SWITCH TAG (LOAD BEING SERVED)

H. PROVIDE THE FOLLOWING INFORMATION AT INDIVIDUAL SUB-FEED BREAKERS LOCATED IN BRANCH PANELS:
   BRANCH SWITCH TAG (LOAD BEING SERVED)

I. CONDUCTOR COLORS SHALL ALSO FOLLOW REQUIREMENTS LISTED IN SPECIFICATIONS SECTION 260553.

5 E6.1 EQUIPMENT LABELING
NO SCALE



TELECOM ROOM GROUNDING NOTES:

1. PROVIDE A TELECOMMUNICATIONS GROUNDING BUSBAR (MTGB OR TGB) IN EACH TELECOMMUNICATIONS ROOM.
2. SEE OVERALL BUILDING GROUNDING RISER FOR TELECOMMUNICATIONS BONDING BACKBONE INFORMATION.

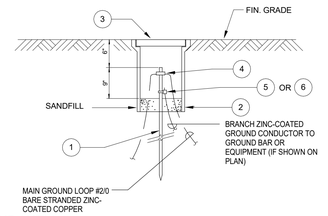
TELECOMMUNICATION BONDING BACKBONE SIZING (EIA 607D)

MAX PBB TO SBB LENGTH (FT)	TBB SIZE
13	#6
21	#4
26.5	#3
33	#2
42	#1
53	#1/0
66.5	#2/0
84	#3/0
106	#4/0
125	250 KCMIL
150	300 KCMIL
175	350 KCMIL
250	500 KCMIL
300	600 KCMIL
375	750 KCMIL

6 E6.1 TELECOMMUNICATIONS ROOM GROUNDING
NO SCALE

BILL OF MATERIALS

ITEM	QTY	DESCRIPTION
1	1	**3/4" DIA. X 10 FT. LG. ZINC-COATED GROUND ROD.**
2	1	9" DIA. X 24" SERIES 9 BROOKS PRODUCT VALVE BOX
3	1	NO. 9 CAST IRON TRAFFIC COVER MARKED "GROUND" - BROOKS PRODUCTS
4	1	GROUNDING MOLD-CADWELD #GTC-182Q
5	AS REQ'D	GROUND CONNECTOR-BURNDY #GAR 6426
6	AS REQ'D	GROUND CONNECTOR-BURNDY #GAR 6429



7 E6.1 GROUND WELL
NO SCALE

LICENSED PROFESSIONAL ENGINEER
DANIEL HOLDEN
E 24792
Exp. 12/31/2025
ELECTRICAL
STATE OF CALIFORNIA
4/2/2025

DLR GROUP
© DLR Group

BATTLES BEARS

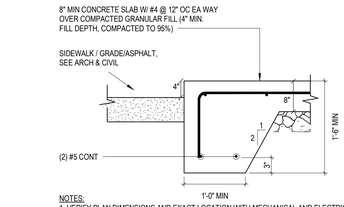
BATTLES ES - TK/K BUILDING
Santa Maria-Bonita School District
605 E Battles Rd, Santa Maria, CA 93454

CONSTRUCTION DOCUMENTS
12/16/2024
REVISIONS
ADDENDUM 1 4/3/2025

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

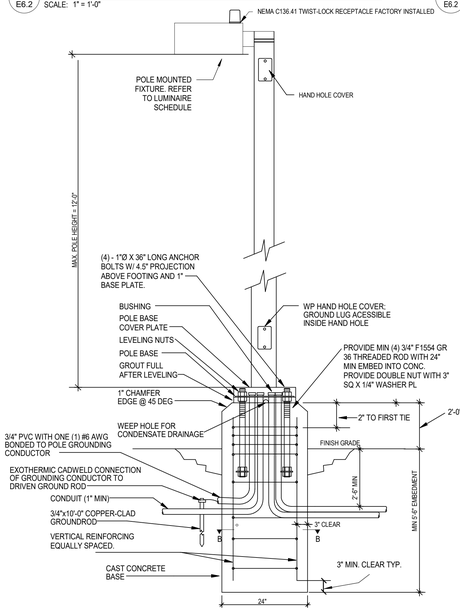
ELECTRICAL DETAILS - GROUNDING

E6.1



NOTES:
1. VERIFY PLAN DIMENSIONS AND EXACT LOCATION WITH MECHANICAL AND ELECTRICAL.
2. PAD SHALL EXTEND 6" MIN BEYOND EDGE OF EQUIPMENT ALL SIDES TYP
3. SEE ELECTRICAL EQUIPMENT SCHEDULE ON E7.1 FOR EQUIPMENT LIST

1 EXTERIOR EQUIPMENT PAD DETAIL
1 / E6.2 SCALE: 1" = 1'-0"

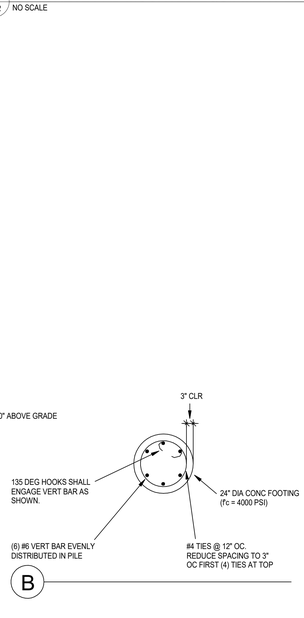


NOTES: SACK RUB SMOOTH CONCRETE BASE OF ALL PHYSICAL DEFORMITIES.

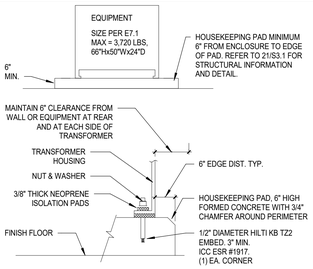
LIGHTING POLES LESS THAN 35' ABOVE GRADE ARE NOT PART OF DSA REVIEW AND APPROVAL PER 2022 CALIFORNIA ADMINISTRATIVE CODE

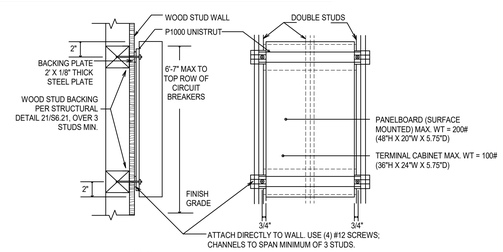
NOT PART OF DSA SS REVIEW AND APPROVAL PER DSA IR A-22, APPENDIX ITEM #20

4 LIGHT POLE ANCHORAGE DETAIL
4 / E6.2 SCALE: 3/16" = 1'-0"



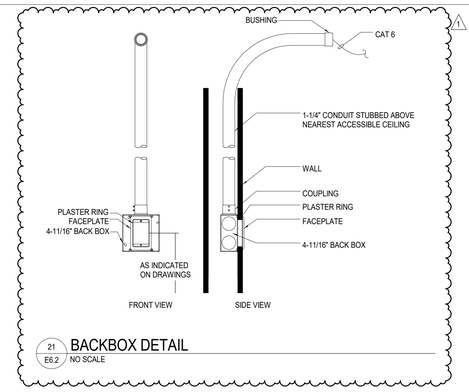
2 CONCRETE PAD MOUNTED EQUIPMENT DETAIL
2 / E6.2 NO SCALE



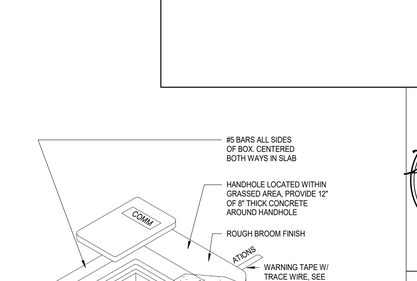


NOTES:
1. REFER TO STRUCTURAL DETAIL 21/S6.21 FOR COMPLETE MOUNTING DETAILS.
2. INSTALL A MEYER'S HUB ON ALL CONDUITS ENTERING PANEL OR PULL BOX FROM TOP OR SIDE.
3. ALL GALVANIZED RIGID CONDUIT AND RISERS SHALL BE TAPED WITH 10MIL TAPE.

3 PANELBOARD MOUNTING DETAIL ON STUD WALL
3 / E6.2 NO SCALE



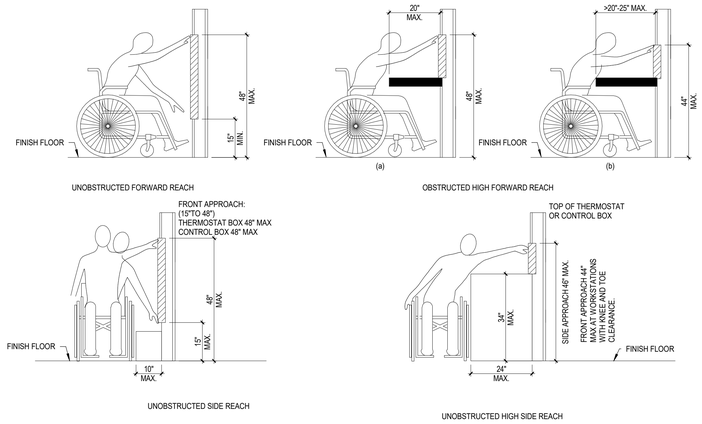
21 BACKBOX DETAIL
21 / E6.2 NO SCALE



WHERE HANDHOLE IS PLACED IN ASPHALT PAVING, POUR AN 8" THICK x 24" MIN. CONCRETE RING AROUND HANDHOLE. REINFORCE W/ #5 REBARS EACH SIDE OF HANDHOLE.

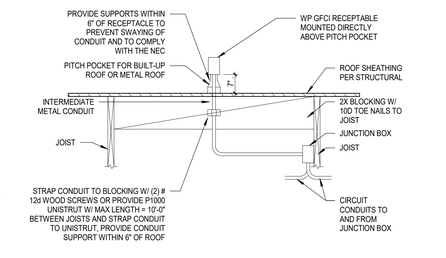
WHERE PLACED IN CONCRETE PAVING OR WALK, POUR CONCRETE INTEGRALLY AROUND BOX. LOCATE BOX 12" MIN. FROM EXPANSION OR CONTRACTION JOINTS. THICKEN CONCRETE AROUND BOX TO MIN. 8" THICK AND REINFORCE W/ #5 REBARS EACH SIDE OF HANDHOLE.

8 HANDHOLE
8 / E6.2 NO SCALE

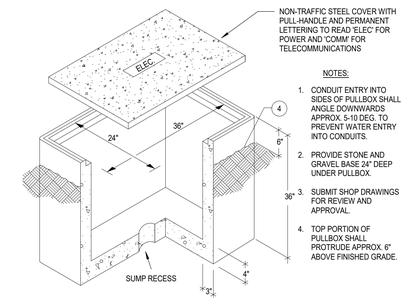


NOTE:
1. FIXTURES AND DEVICES ARE BASED ON 2022 CBC, FIGURE 11B-308.2.1 FOR UNOBSTRUCTED FORWARD REACH, FIGURE 11B-3082.2 FOR OBSTRUCTED HIGH REACH, FIGURE 11B-308.3.1 FOR UNOBSTRUCTED SIDE REACH, AND FIGURE 11B-308.3.2 FOR OBSTRUCTED HIGH SIDE REACH.
2. ALL THERMOSTATS AND CONTROLS SHALL BE INSTALLED AND COMPLIANT PER 2022 CBC 11B-308.
3. PROVIDE 30"WX27"HX19"-25"D MIN. TOE/KNEE CLEARANCE FOR FRONT APPROACH OVER OBSTRUCTION.

5 ACCESSIBLE MOUNTING HEIGHT DETAIL
5 / E6.2 NO SCALE

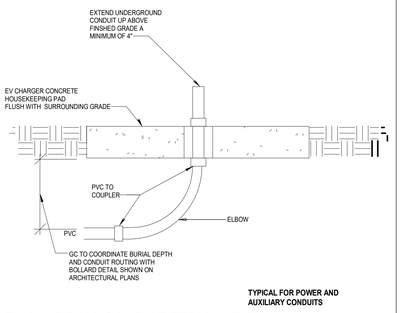


7 ROOF RECEPTABLE MOUNTING DETAIL
7 / E6.2 NO SCALE



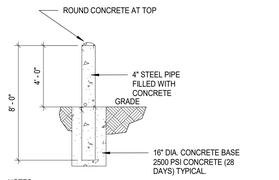
NOTES:
1. CONDUIT ENTRY INTO SIDES OF PULLBOX SHALL ANGLE DOWNWARDS APPROX. 5-10 DEG. TO PREVENT WATER ENTRY INTO CONDUITS.
2. PROVIDE STONE AND GRAVEL BASE 24" DEEP UNDER PULLBOX.
3. SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL.
4. TOP PORTION OF PULLBOX SHALL PROTRUDE APPROX. 6" ABOVE FINISHED GRADE.

9 CONCRETE PULLBOX DETAIL
9 / E6.2 NO SCALE



TYPICAL FOR POWER AND AUXILIARY CONDUITS

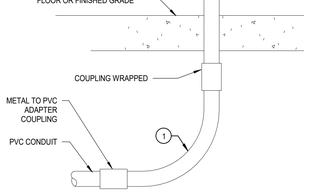
10 EV CHARGING CONDUIT TERMINATION
10 / E6.2 NO SCALE



NOTES:
PROVIDE GUARD POSTS PER CFC 312.2

PAINT ENTIRE PIPE WITH 1 COAT PRIMER AND 2 COATS SAFETY YELLOW ENAMEL PRIOR TO INSTALLATION.

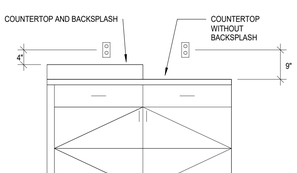
11 TYPICAL PROTECTION BOLLARD
11 / E6.2 NO SCALE



NOTE:

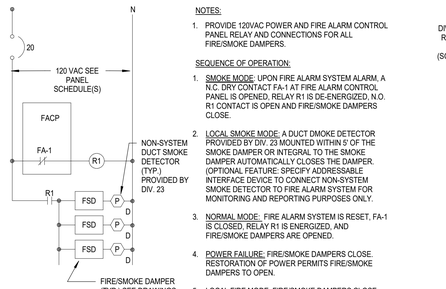
1. MANUFACTURED GALVANIZED RIGID STEEL CONDUIT (GRC) ELBOWS PRE-WRAPPED REQUIRED AT ALL VERTICAL 90° BENDS AND VERTICAL RISES. CONTRACTOR MAY USE EPC-80 PVC OR FIBERGLASS IN-LIEU OF GRC. TYPICAL DETAIL, REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

12 TYPICAL CONDUIT ELBOW
12 / E6.2 NO SCALE



SEE ARCHITECTURAL CASEWORK DETAILS

14 ABOVE COUNTER RECEPTACLES
14 / E6.2 NO SCALE



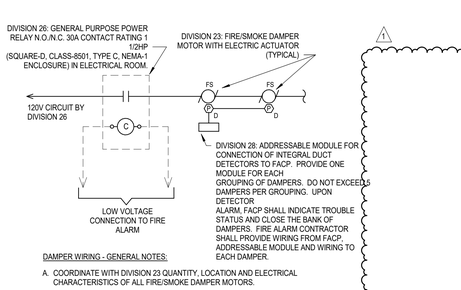
NOTES:

1. PROVIDE 120VAC POWER AND FIRE ALARM CONTROL PANEL RELAY AND CONNECTIONS FOR ALL FIRE/SMOKE DAMPERS.

SEQUENCE OF OPERATION:

1. SMOKE MODE: UPON FIRE ALARM SYSTEM ALARM, A N.C. DRY CONTACT FA-1 AT FIRE ALARM CONTROL PANEL IS OPENED, RELAY R1 IS DE-ENERGIZED, N.O. R1 CONTACT IS OPEN AND FIRE/SMOKE DAMPERS CLOSE.
2. LOCAL SMOKE MODE: A DUCT DMOKE DETECTOR PROVIDED BY DIV. 23 MOUNTED WITHIN 5' OF THE SMOKE DAMPER OR INTEGRAL TO THE SMOKE DAMPER AUTOMATICALLY CLOSES THE DAMPER. (OPTIONAL FEATURE: SPECIFY ADDRESSABLE INTERFACE DEVICE TO CONNECT NON-SYSTEM SMOKE DETECTOR TO FIRE ALARM SYSTEM FOR MONITORING AND REPORTING PURPOSES ONLY.
3. NORMAL MODE: FIRE ALARM SYSTEM IS RESET, FA-1 IS CLOSED, RELAY R1 IS ENERGIZED, AND FIRE/SMOKE DAMPERS ARE OPENED.
4. POWER FAILURE: FIRE/SMOKE DAMPERS CLOSE. RESTORATION OF POWER PERMITS FIRE/SMOKE DAMPERS TO OPEN.
5. LOCAL FIRE MODE: FIRE/SMOKE DAMPERS CLOSE VIA FUSEABLE LINK. MANUAL RESET.

15 FIRE/SMOKE DAMPERS HOOKUP
15 / E6.2 NO SCALE

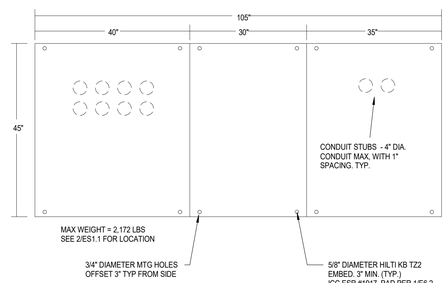


DAMPER WIRING - GENERAL NOTES:

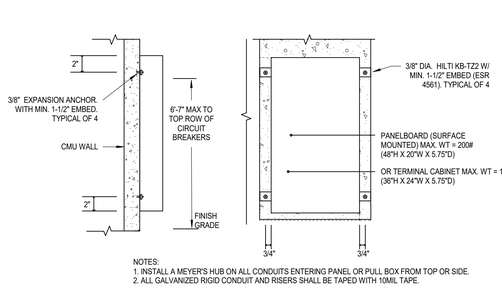
A. COORDINATE WITH DIVISION 23 QUANTITY, LOCATION AND ELECTRICAL CHARACTERISTICS OF ALL FIRE/SMOKE DAMPER MOTORS.

B. COORDINATE INTERCONNECTION REQUIREMENTS FROM RELAY TO FIRE ALARM SYSTEM WITH SYSTEM PROVIDER.

16 TYPICAL FIRE/SMOKE DAMPER WIRING
16 / E6.2 NO SCALE

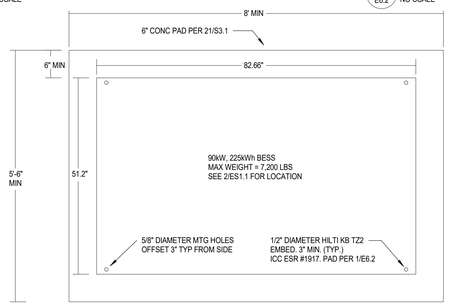


18 ANCHORAGE DETAIL - MSA
18 / E6.2 NO SCALE

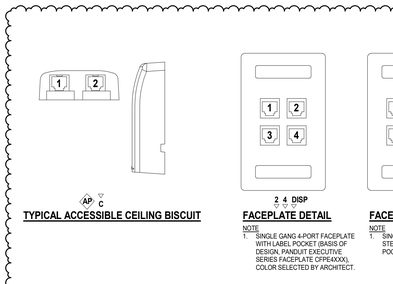


NOTES:
1. INSTALL A MEYER'S HUB ON ALL CONDUITS ENTERING PANEL OR PULL BOX FROM TOP OR SIDE.
2. ALL GALVANIZED RIGID CONDUIT AND RISERS SHALL BE TAPED WITH 10MIL TAPE.

19 PANELBOARD MOUNTING DETAIL ON CMU WALL
19 / E6.2 NO SCALE



20 ANCHORAGE DETAIL - BESS
20 / E6.2 NO SCALE



FACEPLATE TERMINATIONS

COMMENTS	BACK BOX		TAG	JACK TYPE	JACK COLOR	CABLE TYPE	CABLE COLOR	USE
			2 DISP					
			1	CAT 6A RJ45	WHITE	CAT 6A UTP	BLUE	DATA
			2	CAT 6A RJ45	WHITE	CAT 6A UTP	BLUE	DATA
			3	BLANK INSERT	WHITE	-	-	-
			4	BLANK INSERT	WHITE	-	-	-
			4 EL BAS					
	4 11/16" SQ X 2 1/8" DEEP		1	CAT 6A RJ45	WHITE	CAT 6A UTP	BLUE	DATA
			2	CAT 6A RJ45	WHITE	CAT 6A UTP	BLUE	DATA
			3	CAT 6A RJ45	WHITE	CAT 6A UTP	BLUE	DATA
			4	CAT 6A RJ45	WHITE	CAT 6A UTP	BLUE	DATA
			AP C					
	NA		1	CAT 6A RJ45	WHITE	CAT 6A UTP	BLUE	DATA
			2	CAT 6A RJ45	WHITE	CAT 6A UTP	BLUE	DATA
	4 11/16" SQ X 1 1/4" DEEP		G					
			PER PLAN	CAT 6A RJ45	WHITE	CAT 6A UTP	BLUE	DATA

TYPICAL FOR POWER AND AUXILIARY CONDUITS

22 DATA FACEPLATE DETAIL
22 / E6.2 NO SCALE

LICENSED PROFESSIONAL ENGINEER
DANIEL HOLDEN
E 24792
Exp. 12/31/2025
ELECTRICAL
STATE OF CALIFORNIA
4/2/2025

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BATTLES

BEARS

BATTLES ES - TK/K BUILDING

Santa Maria-Bonilla School District

605 E Battles Rd, Santa Maria, CA 93454

CONSTRUCTION DOCUMENTS
12/16/2024
REVISIONS
ADDENDUM 1 4/3/2025

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

ELECTRICAL DETAILS

E6.2

DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION
FACILITIES DEVELOPMENT DIVISION

APPLICATION FOR HCAI PREAPPROVAL OF MANUFACTURER'S CERTIFICATION (OPM)

OFFICE USE ONLY
APPLICATION #: OPM-0196

HCAI Preapproval of Manufacturer's Certification (OPM)

Type: ☐ New ☒ Renewal/Update

Manufacturer Information

Manufacturer: Chatsworth Products
Manufacturer's Technical Representative: Todd Schneider
Mailing Address: 4175 Guardian Street, Simi Valley, CA 93063
Telephone: (203) 969-4862 Email: TSchneider@chatsworth.com

Product Information

Product Name: CUBE iT
Product Type: Communication Equipment
Product Model Number: 11890-X24, 11840-X24, 11996-X24, 11890-X36, 11840-X36, 11996-X36, 11890-X48, 11840-X48, 11996-X48
General Description: Telecommunication Enclosures

Applicant Information

Applicant Company Name: EASE LLC.
Contact Person: Tiffany Tonn
Mailing Address: 1515 FAIRVIEW AVE, STE 205, MISSOULA, MT 59801
Telephone: (406) 541-3273 Email: tiffany@easeco.com
Title: Office Manager

"A healthier California where all receive equitable, affordable, and quality health care"
STATE OF CALIFORNIA – HEALTH AND HUMAN SERVICES AGENCY

DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION
FACILITIES DEVELOPMENT DIVISION

Registered Design Professonal Preparing Engineering Recommendations

Company Name: EASE LLC
Name: Jonathan Roberson California License Number: S4197
Mailing Address: 5877 Pine Ave., Suite 210, Chino Hills, CA 91709
Telephone: (951) 295-1892 Email: jon@EASECo.com

HCAI Special Seismic Certification Preapproval (OSP)

☐ Special Seismic Certification is preapproved under OSP OSP Number:

Certification Method

Testing in accordance with: ☐ ICC-ES AC156 ☐ FM 1950-16
☐ Other(s) (Please Specify):

*Use of criteria other than those adopted by the California Building Standards Code, 2022 (CBSC 2022) for component supports and attachments are not permitted. For distribution system, interior partition wall, and suspended ceiling seismic bracings, test criteria other than those adopted in the CBSC 2022 may be used when approved by HCAI prior to testing.

☒ Analysis
☐ Experience Data
☐ Combination of Testing, Analysis, and/or Experience Data (Please Specify):

HCAI Approval

Date: 8/15/2023
Name: William Staehlin Title: Senior Structural Engineer
Condition of Approval (if applicable):

"A healthier California where all receive equitable, affordable, and quality health care"
STATE OF CALIFORNIA – HEALTH AND HUMAN SERVICES AGENCY

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING

5877 Pine Ave, Ste. 210
Chino Hills, CA. 91709
Phn: (909) 606-7622

The Department of Health Care Access and Information
PREAPPROVAL OF MANUFACTURER'S CERTIFICATION
OPM-0196
THIS PREAPPROVAL CONFORMS TO THE 2022 CALIFORNIA BUILDING CODE

MANUFACTURER: **CHATSWORTH PRODUCTS, INC.** Sheet: 1 of 5
EQUIPMENT NAME: **CUBE iT** Date: 8/3/23

GENERAL NOTES

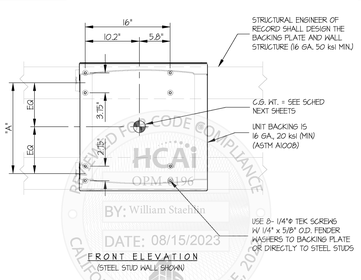
1. THIS HCAI PREAPPROVAL OF MANUFACTURER'S CERTIFICATION (OPM) IS BASED ON THE 2022 CBC. THE DEMANDS (DESIGN FORCES) FOR USE WITH THIS OPM SHALL BE BASED ON THE 2022 CBC
2. THIS DOCUMENT MAY ONLY BE USED WITH THE EXPRESS WRITTEN CONSENT OF THE MANUFACTURER LISTED ABOVE FOR THE SPECIFIC PROJECT SITE AND INSTALLATION LOCATION. THIS DOCUMENT IS INVALID WITHOUT SUCH CONSENT.
3. THIS PREAPPROVAL CONFORMS TO THE 2022 CALIFORNIA BUILDING CODE WHERE Sds IS NOT GREATER THAN 1.60 & 2.30.
4. FORCES PER ASCE 7-16 SECTION 13.3.1, EQUATIONS 13.3-1, 13.3-2 & 13.3-3,
   WHERE Sds = 1.60 a_p = 1.0, I_p = 1.5, R_p = 2.5, z/h ≤ 1 WOOD / STEEL / CONCRETE WALLS.
   WHERE Sds = 2.30 a_p = 1.0, I_p = 1.5, R_p = 2.5, z/h ≤ 1 WOOD / STEEL / CONCRETE WALLS. SEE FOLLOWING SHEETS FOR Ω_0
5. THIS PREAPPROVAL COVERS ONLY THE SUPPORTS AND ATTACHMENTS OF THE EQUIPMENT TO THE STRUCTURE.
6. ALL DESIGN FORCES SHOWN ON THE DRAWINGS ARE FACTORED LOADS THAT SHALL BE USED FOR STRENGTH DESIGN.
7. SHEET METAL SCREWS SHALL BE TEKS SCREWS BY ITW BUILDEX (ICC ESR-1976).
8. CONCRETE WALL DETAIL VALID FOR DEMANDS SHOWN AT ANY ELEVATION. (i.e. z/h ≤ 1)
9. **RESPONSIBILITIES OF THE STRUCTURAL ENGINEER OF RECORD OF THE BUILDING**
   A. PROVIDE SUPPORTING STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN IN ADDITION TO ALL OTHER LOADS.
   B. VERIFY THAT THE INSTALLATION IS IN CONFORMANCE WITH THE 2022 CBC AND WITH THE DETAILS, MATERIAL AND GAGE OF THE UNIT WHERE ATTACHMENTS ARE MADE AGREE WITH THE INFORMATION SHOWN ON THE PREAPPROVAL DOCUMENTS.
   C. VERIFY THAT PROJECT SPECIFIC VALUES OF Sds & z/h RESULT IN SEISMIC FORCES (E_h, E_v) THAT DO NOT EXCEED THE VALUES ON THE DETAILS.
   D. VERIFY THAT THE CONCRETE WALL TO WHICH THE EQUIPMENT IS ANCHORED MEETS THE REQUIREMENTS OF THE APPLICABLE ICC ESR AND THIS OPM.
   E. VERIFY THAT THE ANCHORS ARE AN ADEQUATE DISTANCE FROM ANY CONCRETE WALL EDGES OR OPENINGS (SEE TYPICAL DETAIL ON SHEET 2).
   F. VERIFY THAT ALL NEW OR EXISTING ANCHORS ARE AN ADEQUATE DISTANCE FROM THE UNIT ATTACHMENTS AND CHECK FOR INTERACTION WHERE OTHER ANCHORS ARE WITHIN 18" OR 6hef FROM THIS UNIT'S ANCHORS.
   G. DESIGN BACKING BARS, STUDS, ETC. WHICH THE UNITS ARE ATTACHED TO AS NOTED ON THE DRAWINGS.

REGISTERED PROFESSIONAL ENGINEER JONATHAN ROBERSON No. 4197 EXP. 6-30-2024 STRUCTURAL STATE OF CALIFORNIA 8/15/23

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING www.EquipmentAnchorage.com

CHATSWORTH PRODUCTS, INC. | DES. J. ROBERSON | SHEET 3
CUBE iT | JOB NO. 11-2314 | DATE 8/3/23 | OF 5 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS — WALL MOUNTED



FRONT ELEVATION
(STEEL STUD WALL SHOWN)

NOTES:
1. FORCES ARE DETERMINED PER 2022 CALIFORNIA BUILDING CODE AND ASCE 7-16. STRENGTH DESIGN IS USED. (EXAMPLE: a_p = 1.0, I_p = 1.5, R_p = 2.5, Ω_0 = 2.0, z/h ≤ 1)

Sds =	1.60	2.30
HORZONTAL FORCE (E_h) =	1.15 Wp	1.65 Wp
VERTICAL FORCE (E_v) =	0.32 Wp	0.46 Wp

2. THIS CALCULATION ENCOMPASSES WEIGHTS AND VERTICAL C.G. POSITIONS NOT EXCEEDING VALUES SHOWN.
3. THIS CALCULATION WAS PREPARED WITHOUT KNOWLEDGE OF ANY SITE CONDITION. COMPATIBILITY FOR USE WITH A SITE SHALL BE EVALUATED BY THE STRUCTURAL ENGINEER OF RECORD OF THE INSTALLATION (SEOR). USE REQUIRES APPROVAL BY THE SEOR.
4. STRUCTURAL ENGINEER OF RECORD FOR THE INSTALLATION SHALL VERIFY ALL CONDITIONS, EVALUATE INTERACTION WITH ADJACENT EQUIPMENT AND ANCHORS, AND PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.
5. SEE GENERAL NOTES SHEETS 1 AND 2.

REGISTERED PROFESSIONAL ENGINEER JONATHAN ROBERSON No. 4197 EXP. 6-30-2024 STRUCTURAL STATE OF CALIFORNIA 8/15/23

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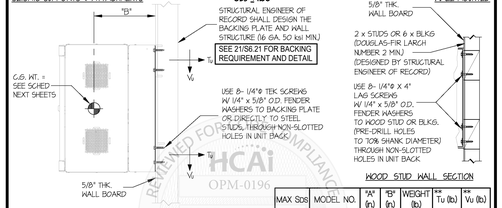
CHATSWORTH PRODUCTS, INC. | DES. J. ROBERSON | SHEET 4
CUBE iT | JOB NO. 11-2314 | DATE 8/3/23 | OF 5 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS — Sds ≤ 1.60 — WALL MOUNTED



STEEL STUD WALL SECTION

WOOD STUD WALL SECTION

MAX Sds	MODEL NO.	"A" (in)	"B" (in)	WEIGHT (lb)	** Tu (lb)	** Vu (lb)
160	11890-X24	17.88	9.13	369	177	104
160	11840-X24	17.88	9.13	389	187	110
160	11996-X24	17.88	9.13	410	197	115
160	11890-X36	30.13	11.88	380	175	107
160	11840-X36	30.13	11.88	403	185	114
160	11996-X36	30.13	11.88	426	196	120
160	11890-X48	42.38	14.63	391	190	110
160	11840-X48	42.38	14.63	417	202	117
160	11996-X48	42.38	14.63	442	214	125

** VALUES DO NOT INCLUDE Ω_0

REGISTERED PROFESSIONAL ENGINEER JONATHAN ROBERSON No. 4197 EXP. 6-30-2024 STRUCTURAL STATE OF CALIFORNIA 8/15/23

REGISTERED PROFESSIONAL ENGINEER DANIEL HOLDEN E 24792 Exp. 12/31/2025 ELECTRICAL STATE OF CALIFORNIA
4/2/2025

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BATTLES ES - TK/K BUILDING
Santa Maria-Bonita School District
605 E Battles Rd, Santa Maria, CA 93454

CONSTRUCTION DOCUMENTS
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DSA App: 03-124614
DSA File No: 42-48
75-24119-00

ELECTRICAL DETAILS

1 E6.4

Autodesk Docs://75-24119-00 SMBSD Battles ES TK-K Classrooms/75-24119-00 SMBSD Battles ES TK-K Classrooms_EL_2024.rvt
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ELECTRICAL EQUIPMENT SCHEDULE

Unit Name	Manufacturer	Dimensions (H"xW"xD")	Max Weight (LBS)	Mounting Location	Mounting Type	Anchorage
MSA	ABB/GE	90X105X56	2172	OUTDOOR	PAD	PER DETAILS 1/E6.2 & 18/E6.2
HK	SIEMENS	48X20X5.75	200	OUTDOOR	WALL	PER DETAIL 3/E6.2
LK	SIEMENS	48X20X5.75	200	OUTDOOR	WALL	PER DETAIL 3/E6.2
MK	SIEMENS	48X20X5.75	208	OUTDOOR	WALL	PER DETAIL 3/E6.2
LEV	SIEMENS	48X20X5.75	200	OUTDOOR	WALL	PER DETAIL 19/E6.2
BESS	SCHNEIDER	92.5X82.67X51	7200	OUTDOOR	PAD	PER DETAILS 1/E6.2 & 20/E6.2
TK	ABB/GE	35.7X34.3X24	1085	OUTDOOR	PAD	PER DETAILS 1/E6.2 & 2/E6.2
TC	ABB/GE	35.7X34.3X24	1085	OUTDOOR	PAD	PER DETAILS 1/E6.2 & 2/E6.2
TEV	ABB/GE	42.2X31.8X24	790	OUTDOOR	PAD	PER DETAILS 1/E6.2 & 2/E6.2
TB	ABB/GE	66X50X38	3720	OUTDOOR	PAD	PER DETAILS 1/E6.2 & 2/E6.2
IK	MYERS	47X30X25	280	OUTDOOR	PAD	PER DETAILS 1/E6.2 & 2/E6.2

LUMINAIRE SCHEDULE

LUMINAIRE CRITERIA			PRODUCT INFORMATION			SOURCE				ELECTRICAL INFORMATION			
TYPE	DESCRIPTION	FINISH	MANUFACTURER	MODEL OR SERIES	ALTERNATE MANUFACTURER	LAMP	LUMENS	COLOR TEMP	CRI	DIMMING TYPE	VOLTAGE	WATTAGE	COMMENTS
FW1	EXTERIOR WALL PACK	MATTE WHITE	EXO LIGHTING	LCN2-48L-20-4K7-3-UNV-WHT	APPROVED EQUAL	LED	2500	4000	70		UNIVERSAL	20	
PL1	PENDANT LINEAR	WHITE	COLUMBIA LIGHTING	MPS-4-9-40-MW-C-W-ED-U-CSHC	APPROVED EQUAL	LED	3580	4000	90	0-10V 1%	UNIVERSAL	26.7	
RD1A	RECESSED LED DOWNLIGHT	SEMI-SPECULAR	PRESCOLITE	LTR-4RD-H-SL-15L-DM1 / LTR-4RD-T-SL-40K-9-XW-SS-WC-WT-AM	APPROVED EQUAL	LED	1474	4000	90	0-10V 1%	UNIVERSAL	18.6	
RD1B	UNDER CANOPY DOWNLIGHT	WHITE	PRESCOLITE	LTR-4RD-H-ML-25L-DM1 / LTR-4RD-T-ML-40K-9-XW-SS-WC-WT-FM-AM	APPROVED EQUAL	LED	3000	4000	90	0-10V 1%	UNIVERSAL	27.8	FLUSH MOUNT MUD-IN RING
RT1A	2X4 RECESSED PANEL	WHITE	COLUMBIA LIGHTING	SRP24-40-MW-G-ED-U	APPROVED EQUAL	LED	3940	4000	90	0-10V 1%	UNIVERSAL	33	
SP1A	SITE LIGHTING POLE	BLACK	BEACON LIGHTING	VP-1-160L-135-3K7-5 QW	APPROVED EQUAL	LED	31,856	3000	70		UNIVERSAL	316	DUAL HEAD, 20' SQUARE STRAIGHT STEEL POLE
SP1B	SITE LIGHTING POLE	BLACK	BEACON LIGHTING	VP-ST-1-36L-105-3K7-4 W-BC	APPROVED EQUAL	LED	8,975	3000	70		UNIVERSAL	108.2	SINGLE HEAD, BACKLIGHT CONTROL, 20' SQUARE STRAIGHT STEEL POLE
SP1C	SITE LIGHTING POLE	BLACK	BEACON LIGHTING	VP-1-160L-135-3K7-4 F	APPROVED EQUAL	LED	15,194	3000	70		UNIVERSAL	158	SINGLE HEAD, 20' SQUARE STRAIGHT STEEL POLE
SP1D	SITE LIGHTING POLE	BLACK	BEACON LIGHTING	VP-1-160L-135-3K7-4 W	APPROVED EQUAL	LED	15,478	3000	70		UNIVERSAL	158	SINGLE HEAD, 20' SQUARE STRAIGHT STEEL POLE
SP2	SITE LIGHTING FLOOD	BLACK	BEACON LIGHTING	RFL3-90L-50-3K7-W-UNV-K-BLT	APPROVED EQUAL	LED	7,000	3000	70		UNIVERSAL	50	KNUCKLE MOUNT UNDER EXISTING PV CANOPY
X1	EXIT SIGN	ALUMINIUM	PROGRESS LIGHTING	PE-ALE-S-G-16	APPROVED EQUAL	LED	N/A	N/A	N/A		UNIVERSAL	1	GREEN LETTERING

GENERAL NOTES:

A. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS AND MOUNTING HEIGHTS OF ALL LUMINAIRES; INFORM LIGHTING DESIGNER OF CONFLICTS AND COORDINATE ALL LOCATIONS WITH DUCTWORK AND PIPING.

B. CONTRACTOR IS RESPONSIBLE TO REVIEW ARCHITECTURAL DRAWINGS TO CONFIRM CEILING TYPES IN ALL ROOMS (ACCESSIBLE, EXPOSED OR "HARD") AND TO USE THE APPROPRIATE WIRING METHOD FOR EACH TYPE. ENSURE ALL J-BOXES ARE ACCESSIBLE AFTER ALL OTHER TRADE'S WORK IS COMPLETED. DO NOT LOCATE ANY J-BOXES ON "HARD" CEILINGS; ALL WIRING MUST BE ACCESSIBLE THROUGH LUMINAIRE ONLY IN "DAISY-CHAIN" METHOD OR WITH DEDICATED HOMERUNSTO EACH LUMINAIRE. J-BOXES MAY BE LOCATED ABOVE OTHER TRADE'S ACCESS DOORS IF FEASIBLE AND DOES NOT INTERFERE WITH ACCESS.

C. ALL LOW VOLTAGE CABLING TO LIGHTING FIXTURES AND CONTROL DEVICES SHALL BE PLENUM RATED.

D. EXIT SIGNS TO BE CIRCUITED TO NEAREST EMERGENCY CIRCUIT SERVING THE SPACE.

SCHEDULE NOTES

LIGHTING CONTROL SEQUENCE OF OPERATION

		CONTROL TYPE										
			TIMECLOCK			OCCUPANCY SENSOR					DAYLIGHT SENSOR	NOTES
		PHOTOCELL TARGET ILLUMINANCE	TIMECLOCK ON	TIMECLOCK OFF	VACANCY MODE (MANUAL ON)	OCCUPANCY MODE (MANUAL OFF)	ON AT 100% OUTPUT	PREVIOUS OCCUPIED LIGHT LEVEL	HIGH/LOW OCCUPIED 100% VACANT 50%	TIMEOUT	DAYLIGHT ZONES	
	CLASSROOM	30-40FC			X			X		5 MIN	X	
	CIRCULATION	10-20FC	X	X		X	X		X	15 MIN	X	
	EMERGENCY EGRESS PATH	1FC	X				X			15 MIN	-	
	FACULTY/STUDENT WORK AREA	30-40FC			X			X		15 MIN	X	
	BREAK ROOMS	10FC			X			X		5 MIN	X	
	FLEX SPACES	10FC		X	X			X		15 MIN	X	
	ELEC/MECH/PLUMB	20FC			X					20 MIN	-	
	JANITORIAL/STORAGE	20FC			X					15 MIN	-	
	GYMNASIUM	100FC			X	X		X		-	-	
	ADMINISTRATION	30FC			X			X		15 MIN	X	
	OFFICES	30-40FC			X			X		5 MIN	X	
	RESTROOM/LOCKER	15FC			X			X		10 MIN	X	
	COMMONS	20-30FC	X	X	X		X		X	15 MIN	X	
	SPECIAL NEEDS	20-50FC			X			X		15 MIN	X	

EXTERIOR LIGHTING CONTROL SEQUENCE OF OPERATIONS

LOCATION	TARGET ILLUMINANCE	ZONE CONTROL	OCCUPANCY SENSOR		TIMECLOCK		UL924 EMERGENCY DEVICES
			OPERATION	TIMEOUT	OPERATION ON	OPERATION OFF	
PARKING	1FC AVG / .5FC MIN	-	WHEN NO OCCUPANCY DETECTED, LIGHTS IN ZONE DIM TO 50% OUTPUT	15 MIN	ASTRONOMICAL TIMECLOCK ON 20MIN BEFORE DUSK	ASTRONOMICAL TIMECLOCK OFF 20MIN AFTER DAWN	REFER TO PLANS FOR KEYED ZONING BY LOWERCASE LETTER FOR NORMAL OPERATION AND SHADING FOR EM OPERATION. 100% OUTPUT UPON LOSS OF NORMAL POWER.
PRIMARY PEDESTRIAN PATHS	1FC AVG / .1FC MIN	-	FOR SAFETY, NO OCCUPANCY CONTROL	-	ASTRONOMICAL TIMECLOCK ON 20MIN BEFORE DUSK	ASTRONOMICAL TIMECLOCK OFF 20MIN AFTER DAWN	
BUILDING ENTRIES	1FC AVG	-	FOR SAFETY, NO OCCUPANCY CONTROL	-	ASTRONOMICAL TIMECLOCK ON 20MIN BEFORE DUSK	ASTRONOMICAL TIMECLOCK OFF 20MIN AFTER DAWN	

LICENSED PROFESSIONAL ENGINEER
DANIEL HOLDEN
E 24792
Exp. 12/31/2025
ELECTRICAL
STATE OF CALIFORNIA
4/2/2025

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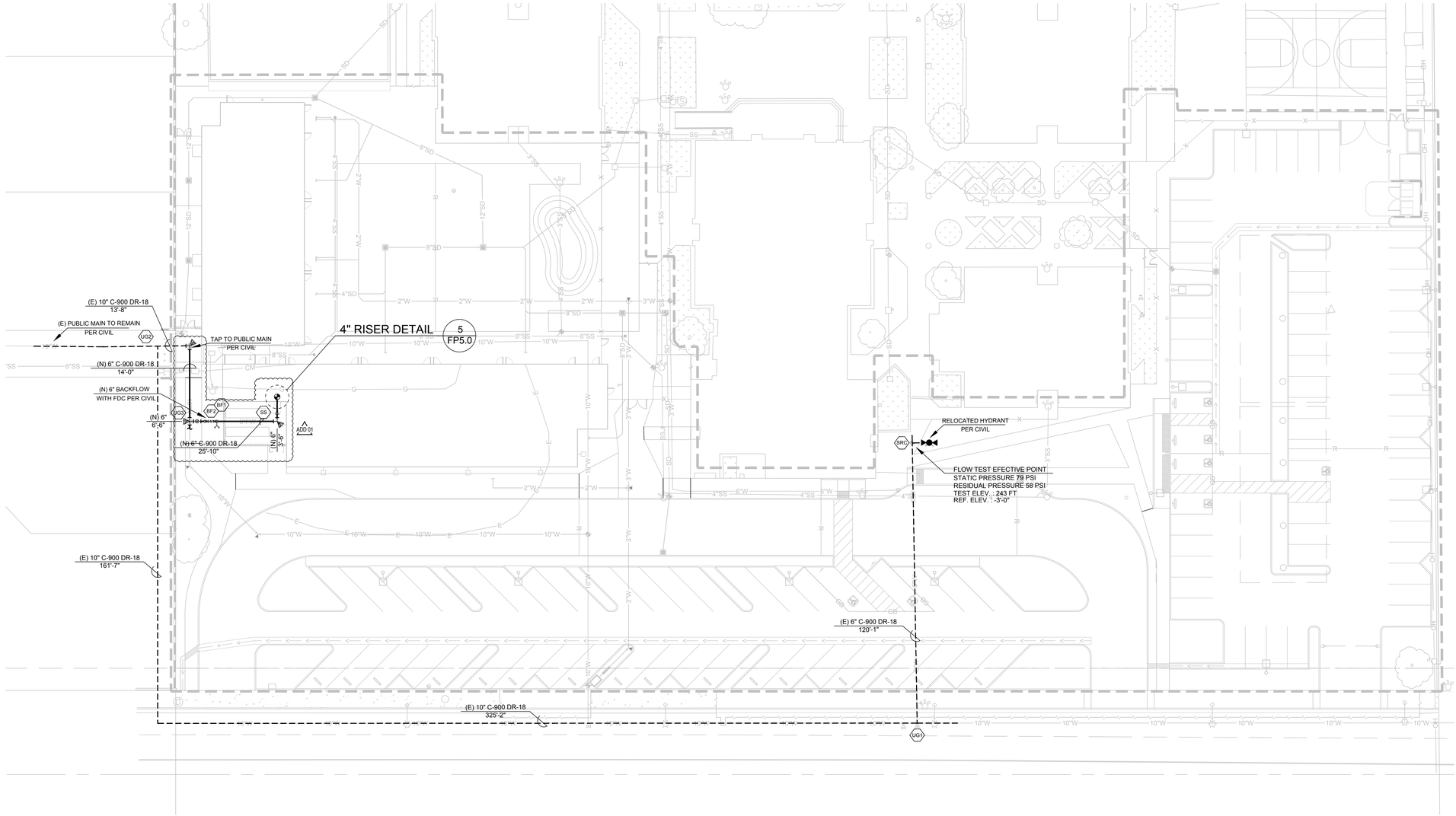
BATTLES ES - TK/K BUILDING
Santa Maria-Bonita School District
605 E Battles Rd, Santa Maria, CA 93454

CONSTRUCTION DOCUMENTS
12/16/2024
REVISIONS
ADDENDUM 1 4/3/2025

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

ELECTRICAL SCHEDULES

E7.1



UNDERGROUND SITE FIRE PIPING PLAN

PLAN NORTH

SCALE: 1" = 20'-0"

0' 10' 20' 40' 60'

SITE PIPING SHOWN
FOR HYDRAULIC REFERENCE ONLY
SEE CIVIL PLANS FOR
DETAILS OF CONSTRUCTION

DLRGROUP

BATTLES ES - TK/K BUILDING

605 E Battles Rd, Santa Maria, CA 93454

CONSTRUCTION DOCUMENTS
12/16/2024
REVISIONS
3/17/2025 ADD 01

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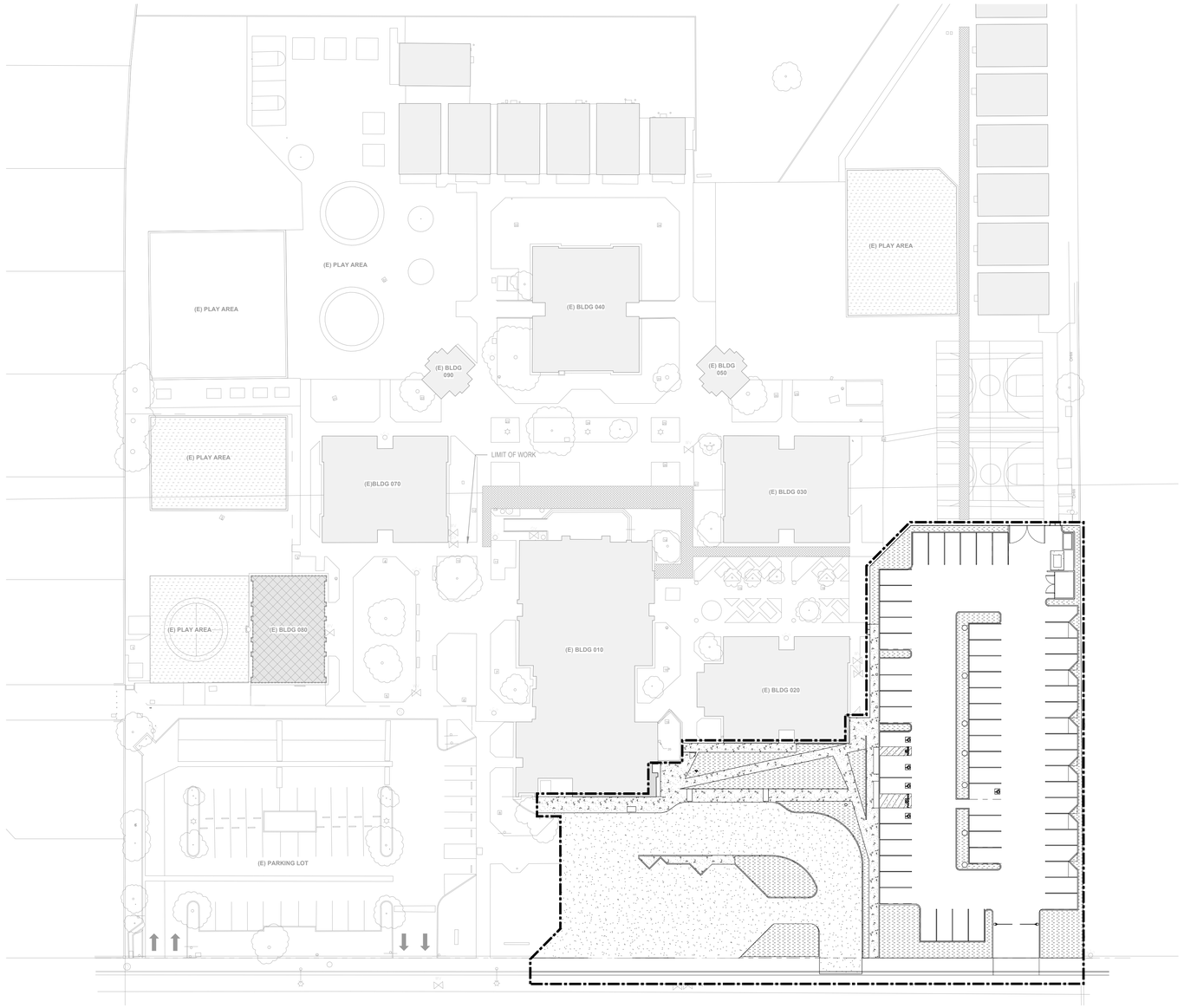
DSA File No: 42-48
75-24119-00

UNDERGROUND SITE FIRE PIPING PLAN

FP1.1

REGISTERED PROFESSIONAL ENGINEER
JONATHAN S. MITCHELL
FP 1559
Exp 06/26
FIRE PROTECTION
STATE OF CALIFORNIA

PROTECTION DESIGN AND CONSULTING
2851 Camino Del Rio S. # 210
San Diego, California 92108
www.protectiondesign.com
phone 619.255.8964
fax 619.255.9547



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SUMMER 2025 WORK - EXHIBIT

SCALE: 1" = 30'-0"

PHASE 1 - SUMMER 2025 WORK

AREA OF SCOPE OF SUMMER WORK FOR PARKING LOT

SCOPE INCLUDES:

- PARKING LOT SURFACE WORK & STRIPING
- UNDERGROUND CONDUIT & INFRASTRACTURE (LIGHTS, POWER, EVs, BESS, MSA, LEV PANEL)
- EV CHARGING EQUIPMENT
- PARKING LOT CURBS, SIDEWALKS
- FENCING AND GATES
- MECHANICAL ENCLOSURES AND EQUIPMENT PADS
- SITE LIGHTING POLES AND FOOTINGS
- VEHICLE BARRIER GATE ARM AT EAST PARKING LOT ENTRANCE
- PLANTING AREAS WITH IRRIGATION
- RELOCATED HYDRANT
- (2) DRIVEWAYS AND RELATED PUBLIC RIGHT OF WAY WORK
- UTILITY WORK CONNECTIONS COMPLETE FOR FULLY FUNCTIONING CAMPUS INCLUDING BUT NOT LIMITED TO:
  - o SEWER,
  - o WATER,
  - o GAS,
  - o FIBER

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BATTLES ES - TK/K BUILDING

Santa Maria-Bonita School District

605 E Battles Rd, Santa Maria, CA 93454

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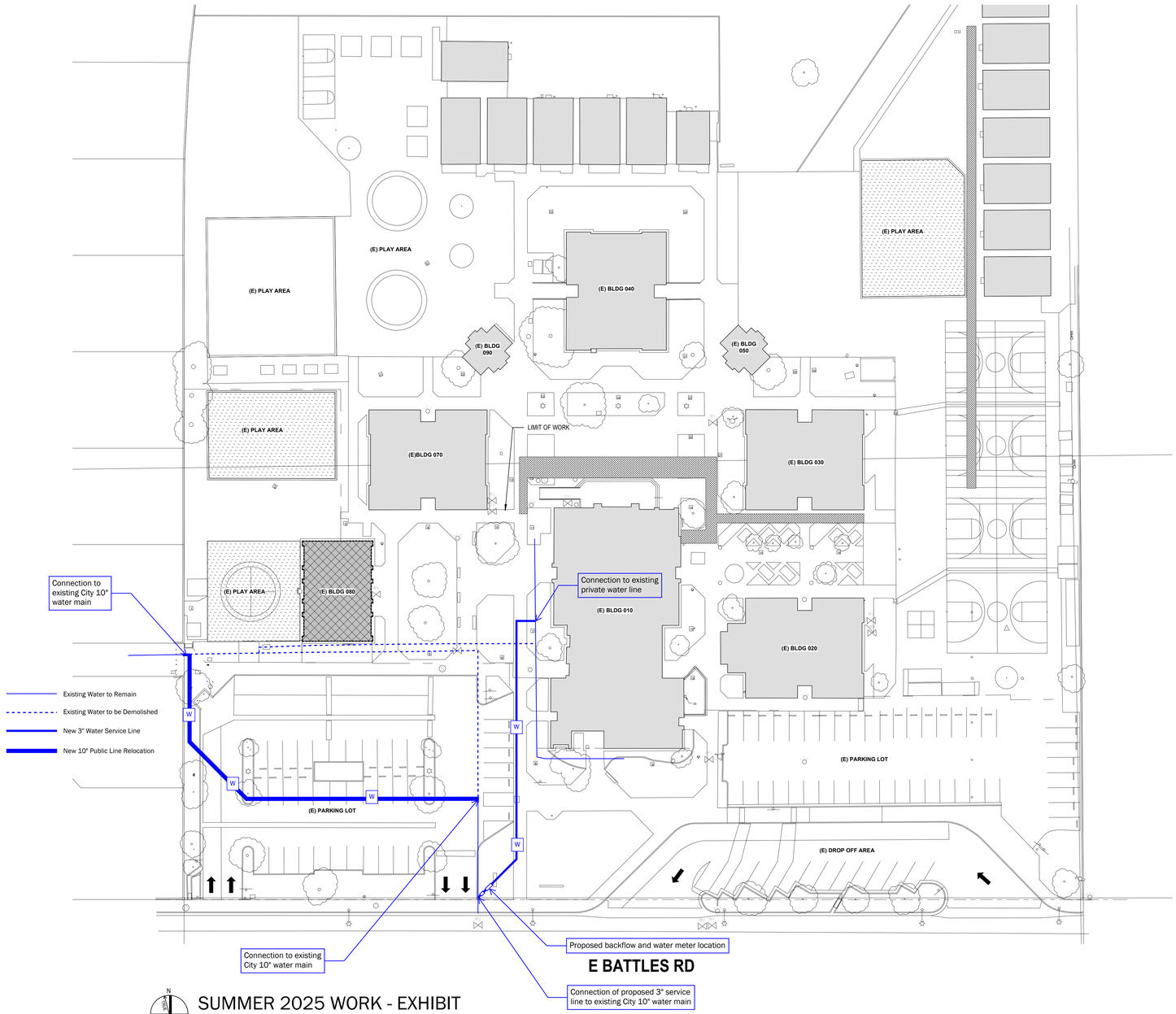
SUMMER 2025 WORK - EXHIBIT

ASK-001A

3/17/2025



SUMMER 2025 WORK - EXHIBIT

PHASE 1 - SUMMER 2025 WORK

· EXACT WATER LINE LOCATION IS NOT KNOWN, GC TO POTHOLE AND CONFIRM LOCATION PRIOR TO WORK. GC SHALL SHARE LOCATION AND FINDINGS WITH THE DISTRICT AND DESIGN TEAM.

· UTILITY WORK CONNECTIONS COMPLETE FOR FULLY FUNCTIONING CAMPUS INCLUDING BUT NOT LIMITED TO:
- o SEWER,
- o WATER,
- o GAS,
- o FIBER

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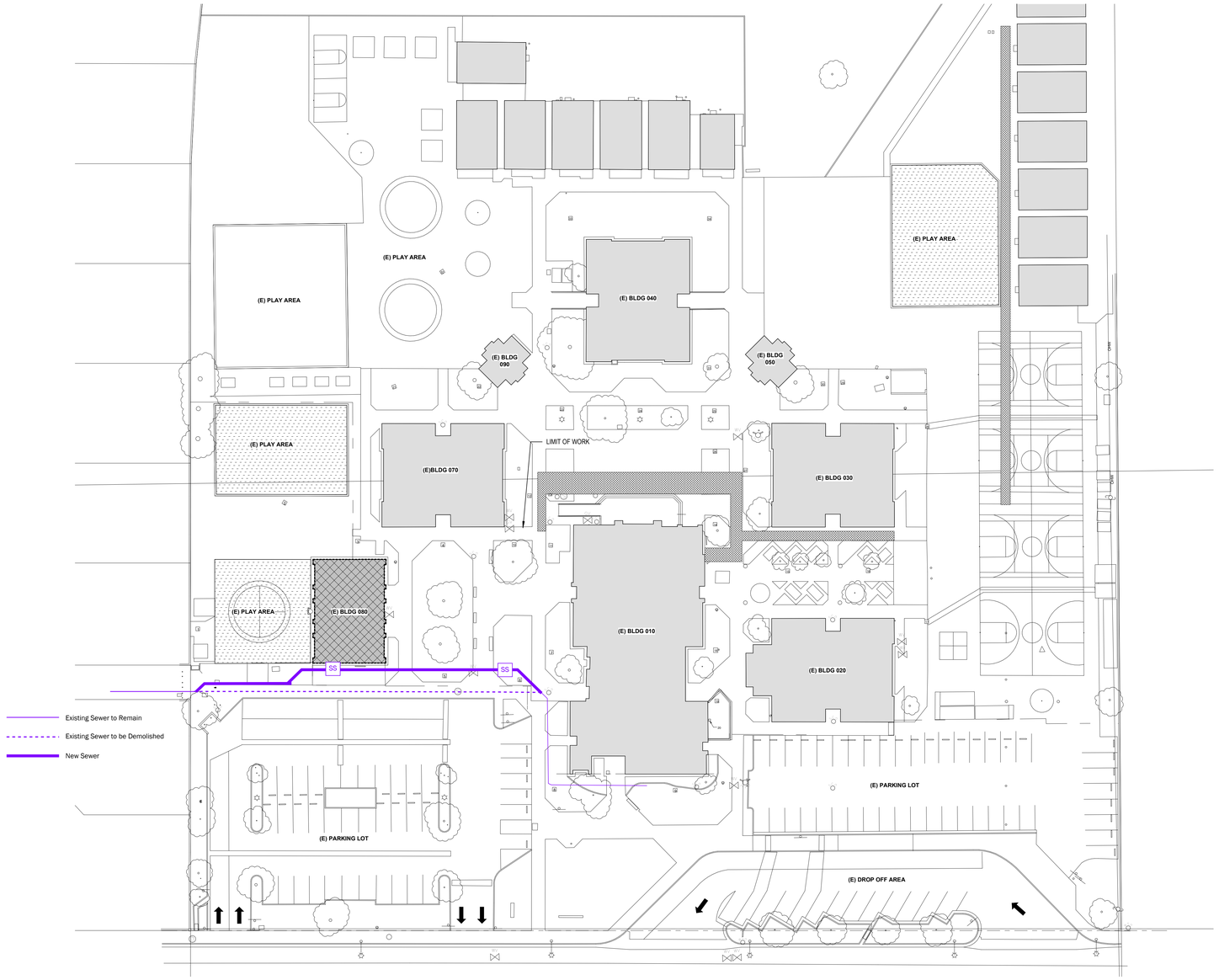
SUMMER 2025 WORK - EXHIBIT

ASK-001B

3/17/2025



E BATTLES RD

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SUMMER 2025 WORK - EXHIBIT

SCALE: 1" = 30'-0"

PHASE 1 - SUMMER 2025 WORK

· UTILITY WORK CONNECTIONS COMPLETE FOR FULLY FUNCTIONING CAMPUS INCLUDING BUT NOT LIMITED TO:
- o SEWER,
- o WATER,
- o GAS,
- o FIBER

DLRGROUP

BATTLES ES - TK/K BUILDING

Santa Maria-Bonita School District

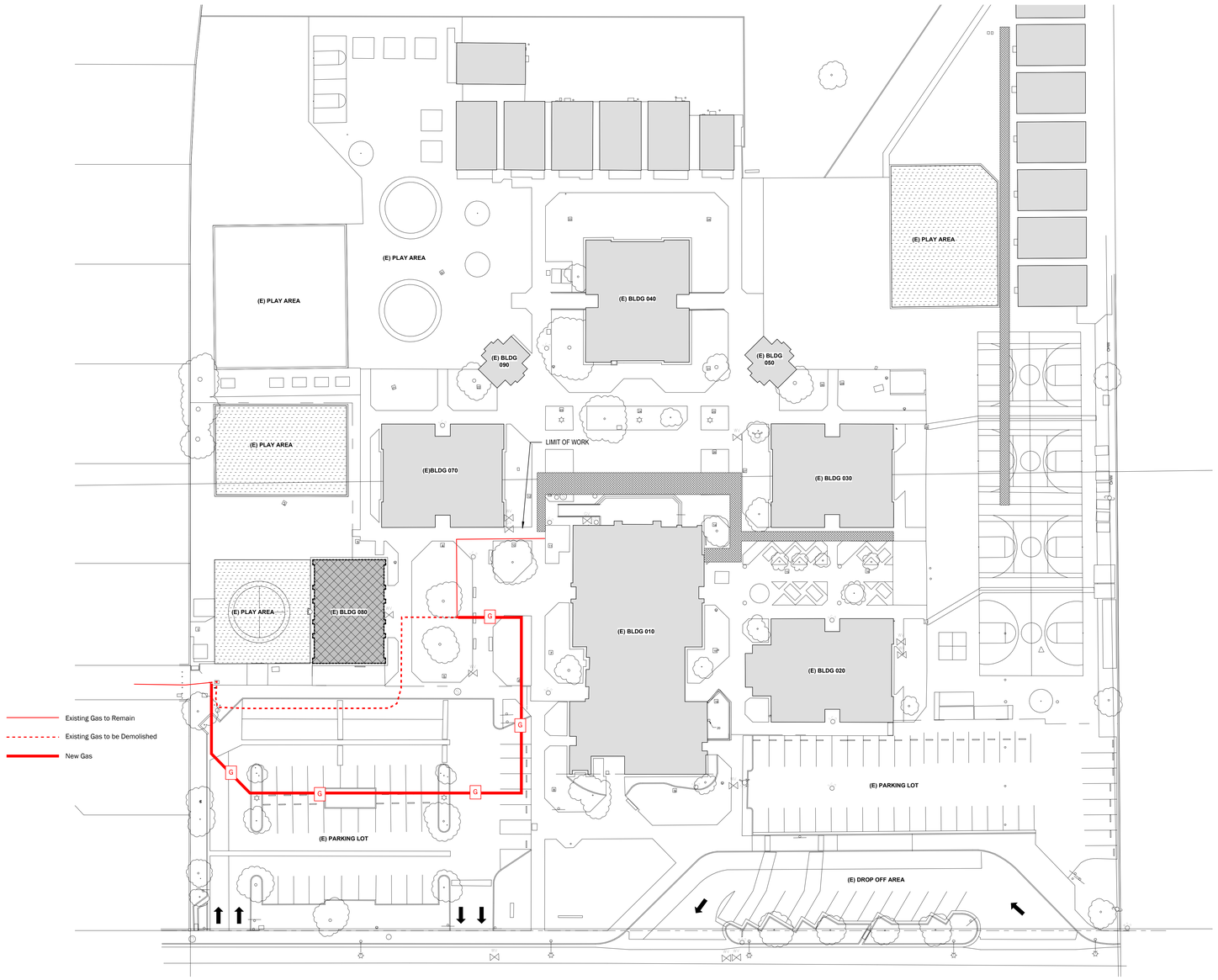
605 E Battles Rd, Santa Maria, CA 93454

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

SUMMER 2025 WORK - EXHIBIT

ASK-001C

3/17/2025



E BATTLES RD

N

SUMMER 2025 WORK - EXHIBIT

SCALE: 1" = 30'-0"

PHASE 1 - SUMMER 2025 WORK

· UTILITY WORK CONNECTIONS COMPLETE FOR FULLY FUNCTIONING CAMPUS INCLUDING BUT NOT LIMITED TO:
- o SEWER,
- o WATER,
- o GAS,
- o FIBER

DLRGROUP

BATTLES ES - TK/K BUILDING

Santa Maria-Bonita School District

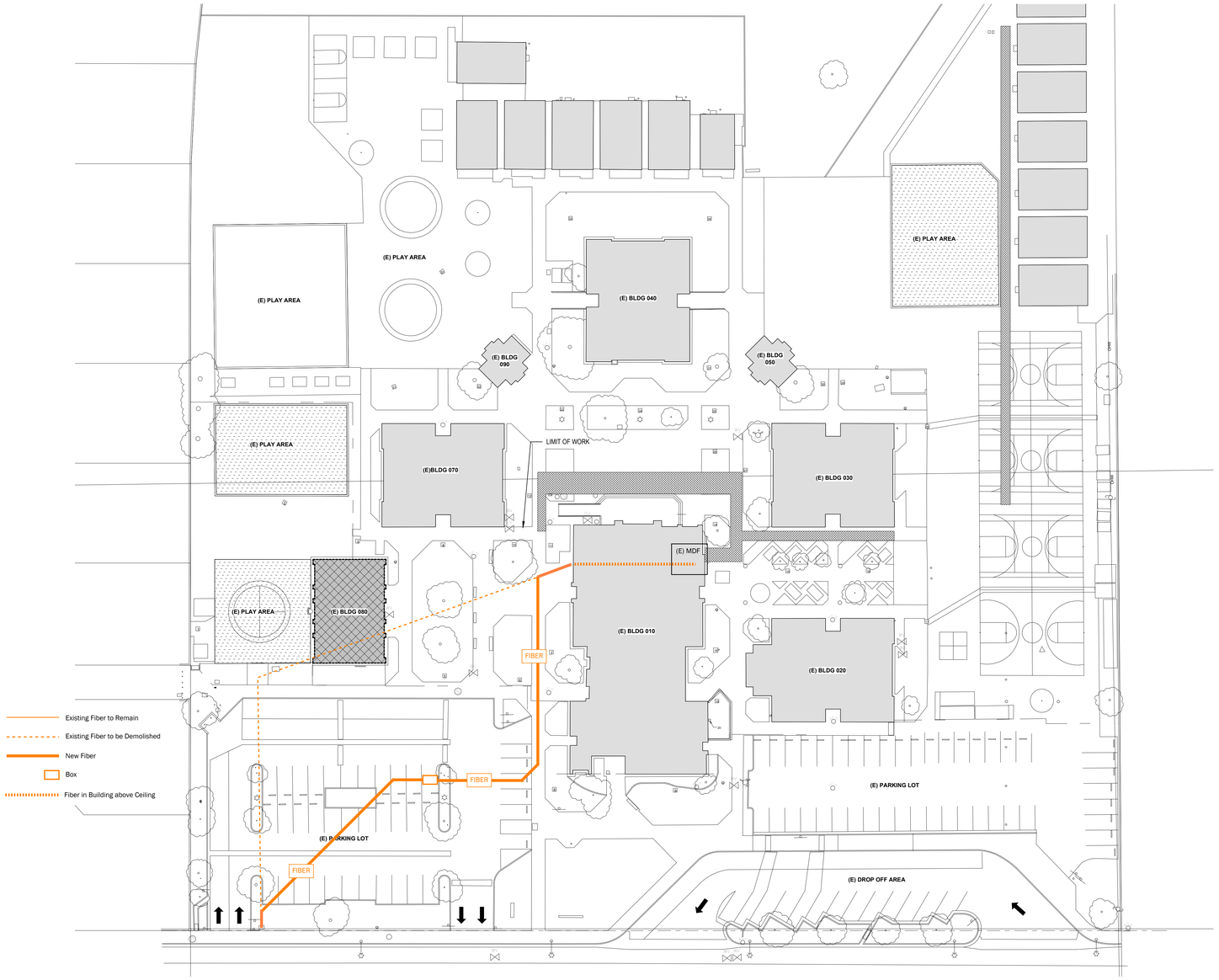
605 E Battles Rd, Santa Maria, CA 93454

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

SUMMER 2025 WORK - EXHIBIT

ASK-001D

3/17/2025



E BATTLES RD

N

SUMMER 2025 WORK - EXHIBIT

SCALE: 1" = 30'-0"

PHASE 1 - SUMMER 2025 WORK

· UTILITY WORK CONNECTIONS COMPLETE FOR FULLY FUNCTIONING CAMPUS INCLUDING BUT NOT LIMITED TO:
- o SEWER,
- o WATER,
- o GAS,
- o FIBER

DLRGROUP

BATTLES ES - TK/K BUILDING

Santa Maria-Bonita School District

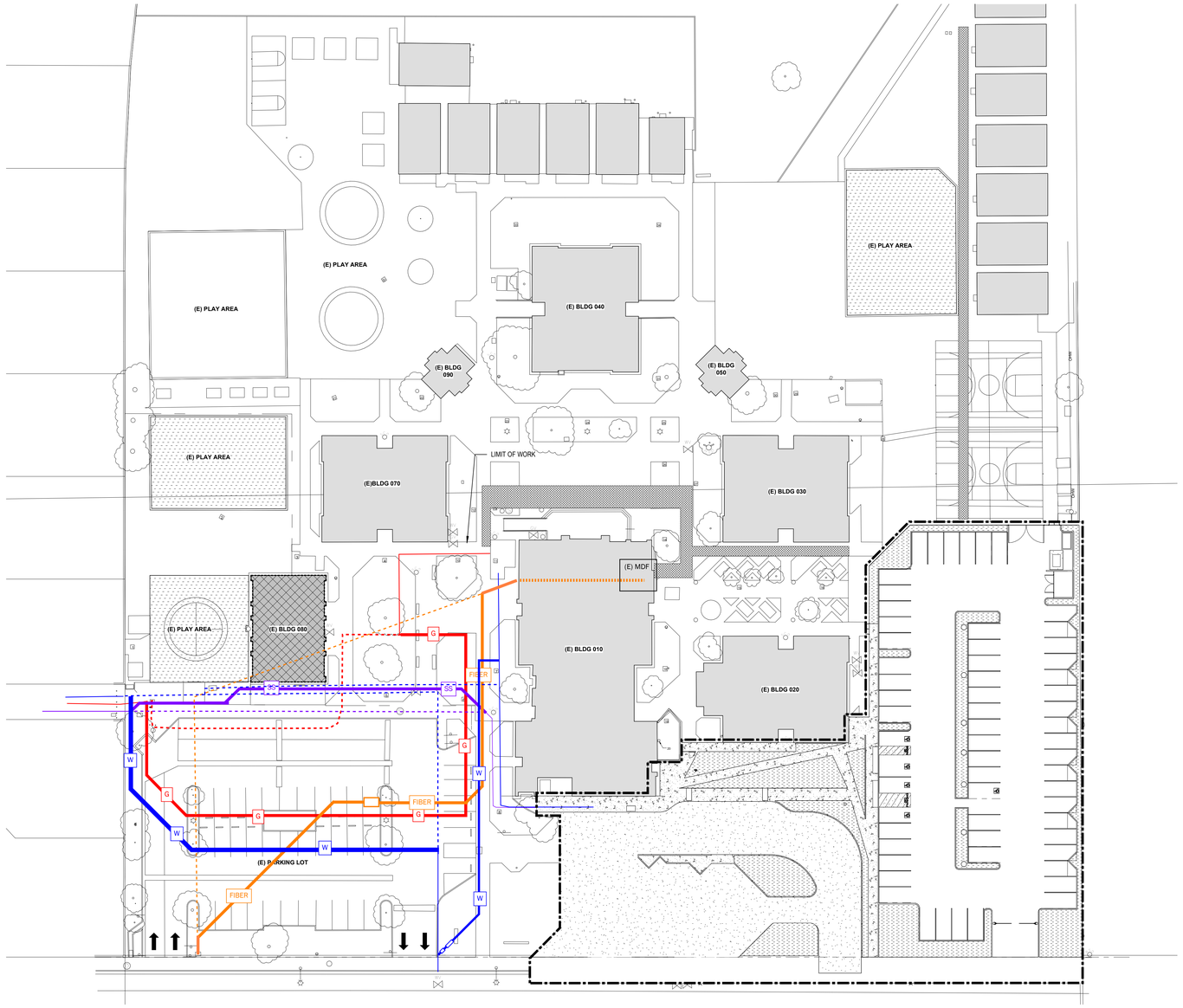
605 E Battles Rd, Santa Maria, CA 93454

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

SUMMER 2025 WORK - EXHIBIT

ASK-001E

3/17/2025



N

SUMMER 2025 WORK - EXHIBIT

SCALE: 1" = 30'-0"

PHASE 1 - SUMMER 2025 WORK

AREA OF SCOPE OF SUMMER WORK FOR PARKING LOT

- UTILITY WORK CONNECTIONS COMPLETE FOR FULLY FUNCTIONING CAMPUS INCLUDING BUT NOT LIMITED TO:
  - o SEWER,
  - o WATER,
  - o GAS,
  - o FIBER

DLRGROUP

BATTLES ES - TK/K BUILDING

Santa Maria-Bonita School District

605 E Battles Rd, Santa Maria, CA 93454

DSA App: 03-124614
DSA File No: 42-48
75-24119-00

SUMMER 2025 WORK - EXHIBIT

ASK-001F

3/17/2025

SOILS ENGINEERING REPORT
NEW TK/K BUILDING AND SITE IMPROVEMENTS
BATTLES ELEMENTARY SCHOOL
605 EAST BATTLES ROAD
SANTA MARIA, CALIFORNIA

PROJECT GS00433-1

Prepared for

Santa Maria-Bonita
School District
Attn: Javier Cavazos
321 North Thornburg Street
Santa Maria, CA

Prepared by

GEOSOLUTIONS, INC.
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(805) 543-8539

June 11, 2024

SOILS ENGINEERING REPORT

DATE
June 11, 2024

PROJECT NUMBER
GS00433-1

CLIENT
Santa Maria-Bonita
School District
Attn: Javier Cavazos
321 North Thornburg Street
Santa Maria, CA 93458

PROJECT
New TK/K Building and Site
Improvements
Battles Elementary School
605 E Battles Road
Santa Maria, CA

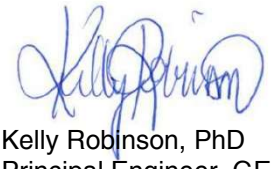
Dear Santa Maria-Bonita School District:

This Soils Engineering Report has been prepared for the proposed New Transitional Kindergarten and Kindergarten Building and Site Improvements Project to be located at Battles Elementary School, 605 East Battles Road, Santa Maria, California. Geotechnically, the site is suitable for the proposed development provided the recommendations in this report for site preparation, earthwork, foundations, slabs, retaining walls, and pavement sections are incorporated into the design.

Logs of exploratory borings, results of laboratory testing and our geologic and geotechnical findings pertaining to the project are provided within. Geotechnically, the site is suitable for the proposed development provided the recommendations in this report for site preparation, earthwork, slabs, and foundations are incorporated into the design.

Thank you for the opportunity to have been of service in preparing this report. If you have any questions, please contact the undersigned at (805) 543-8639.

Sincerely,
GeoSolutions, Inc.



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BATTLES ELEMENTARY SCHOOL
605 EAST BATTLES ROAD
SANTA MARIA, CALIFORNIA

PROJECT GS00433-1

1.0 INTRODUCTION

This report presents the results of the geotechnical exploration for the proposed New Transitional Kindergarten and Kindergarten (TK/K) Building and Site Improvements Project to be located at Battles Elementary School, 605 East Battles Road, Santa Maria, California. See Figure 1: Site Location Map (USGS, 2022) for the general location of the project and surrounding topography.

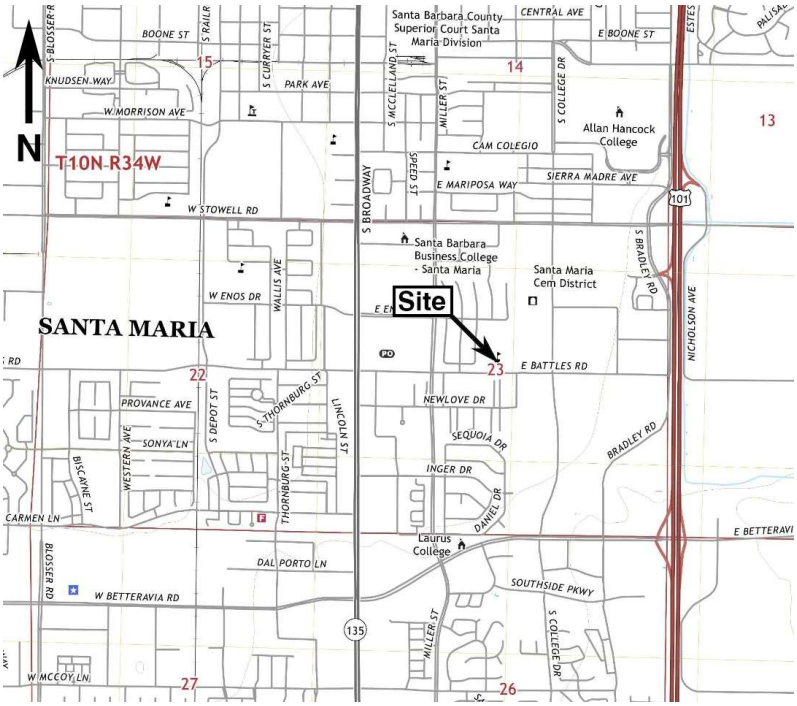

Figure 1: Site Location Map

1.1 Site Description

The proposed new TK/K building is to be located at approximately 34.9319 degrees north latitude and -120.4287 degrees east longitude, in the southeastern area of the existing Battles Elementary School property. The Battles Elementary School is approximately 535 feet (E-W) by 860 feet (N-S) and is bound by East Battles Road to the South and East Enos Drive to the north.

Parking improvements and proposed structures are to be located in the southern portion of the property. The area of the proposed new TK/K structure and associated parking improvements will hereafter be referred to as the "Site." See Figure 2: Proposed Site Plan.

The Site is currently developed with existing structures, grass, flatwork, sports courts, and parking areas. It is anticipated that the existing structure within the footprint of the proposed TK/K building and other improvements at the Site will be removed as part of this project.

The Site is situated an average elevation of approximately 230 feet (NAVD 88) and slopes very gradually to the west, with approximately 3 feet of elevation difference across the Site. Surface drainage flows to existing drainage facilities along East Battles Road.

1.2 Project Description

The proposed development is anticipated to consist of constructing a single-story TK/K building with a footprint of approximately 11,860 square feet, as well as associated surface/parking improvements, photovoltaic shade structures, utilities, and landscaping. See Figure 2: Proposed Site Plan for the layout of proposed improvements at the Site. Figure 2: Proposed Site Plan was provided to us by the Client.

It is anticipated that the proposed structure will utilize a slab-on-grade lower floor system. Dead and sustained live loads are currently unknown, but they are anticipated to be relatively light.

A *Geotechnical Investigation Report* dated January 15, 2024, was prepared by BSK Associates and provides geotechnical for the proposed photovoltaic shade structures (BSK Associates, 2024). The scope of this report is limited to the proposed TK/K building and surface improvements.

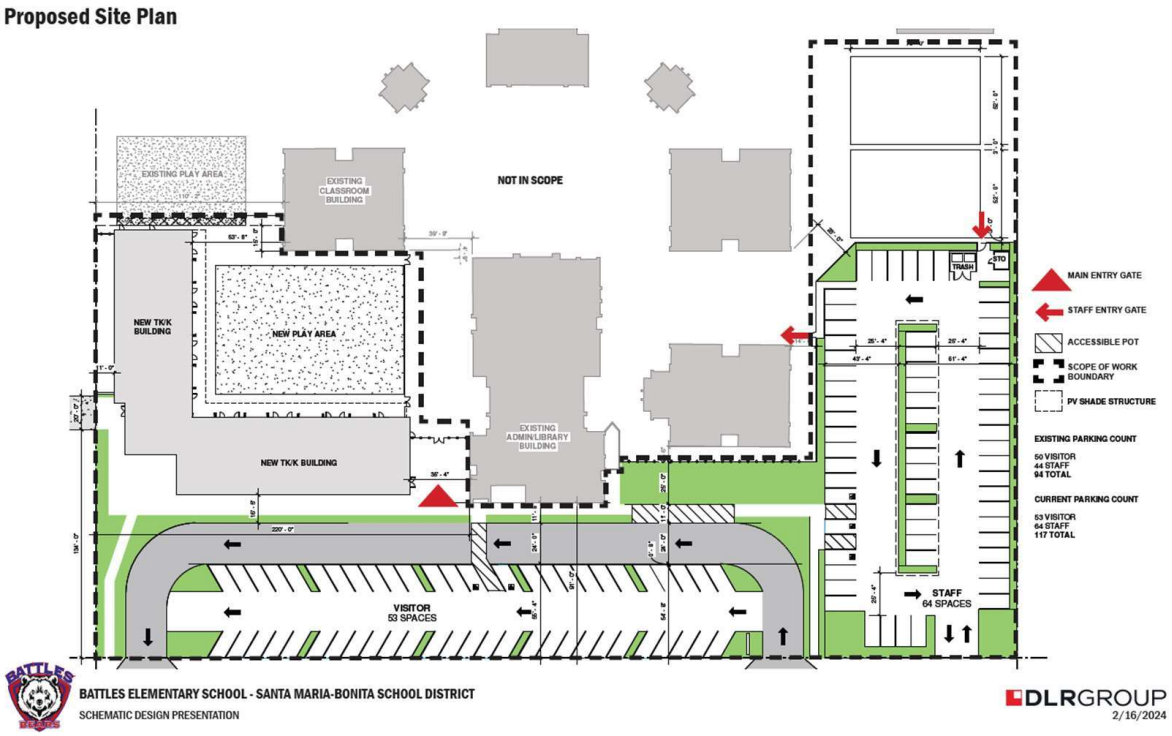

Figure 2: Proposed Site Plan

2.0 WORK PERFORMED

2.1 Purpose and Scope

The purpose of this study was to explore and evaluate the surface and sub-surface soil conditions at the Site and to develop geotechnical information and design criteria. The scope of this study includes the following items:

1. A literature review of available geotechnical data pertinent to the project site including geologic maps and available on-line aerial photographs.

2. A field exploration consisting of site reconnaissance and subsurface exploration including exploratory borings in order to formulate a description of the sub-surface conditions at the Site.

3. Laboratory testing performed on representative soil samples that were collected during our field exploration.

4. Engineering analysis of the data gathered during our literature review, field study, and laboratory testing.

5. Development of recommendations for site preparation and grading as well as geotechnical design criteria for foundations, pavement sections, underground utilities, and drainage facilities.

2.2 Field Exploration

The field exploration for the project was performed on April 4th and 5th, 2024 using a CME-55 drill rig equipped with an 8-inch diameter, hollow-stem auger and a Mobile B-24 drill rig equipped with a 6-inch diameter solid-stem auger. The field exploration consisted of advancing six (6) exploratory borings at the Site. See Figure 3: Field Exploration for the approximate boring locations.

Boring B-1 was advanced to a maximum depth of approximately 49 feet below ground surface (bgs). Borings B-2 through B-6 were advanced to maximum depths of approximately 15 feet bgs.

Sampling methods included the Standard Penetration Test (SPT) utilizing a standard split-spoon sampler without liners, a Modified California sampler (CA) with liners, and collection of bulk samples from auger cuttings. The Mobile B-24 drill rig was equipped with a safety hammer, which has an efficiency of approximately 60 percent. The CME-55 drill rig was equipped with an automatic hammer, which has an efficiency of approximately 80 percent. The hammers were used to drive samplers and obtain test blow counts in the form of N-values.

During the boring operations, the subsurface conditions encountered were continuously logged under the direction of the project engineer. Additional information regarding the field exploration and logs of the borings are provided in **Appendix A**.

2.3 Laboratory Testing

Laboratory tests were performed on representative soil samples that were obtained from the Site during the field exploration. Results and explanations of the tests are provided in **Appendix B**. The testing performed for the project included the following:

- Soil Classification (ASTM D2487, ASTM D2488)
- Particle Size Analysis (ASTM D422)
- Liquid Limit, Plastic Limit, and Plasticity Index (ASTM 4318)
- Laboratory Maximum Density (ASTM D1557)
- Direct Shear (ASTM D3080)
- Consolidation (ASTM D2435)
- R-Value (ASTM D2844)
- Corrosivity Evaluation (redox, pH, resistivity, sulfide, chloride / sulfate – ASTM D1498, D4972, G57, D4658M, D4327)

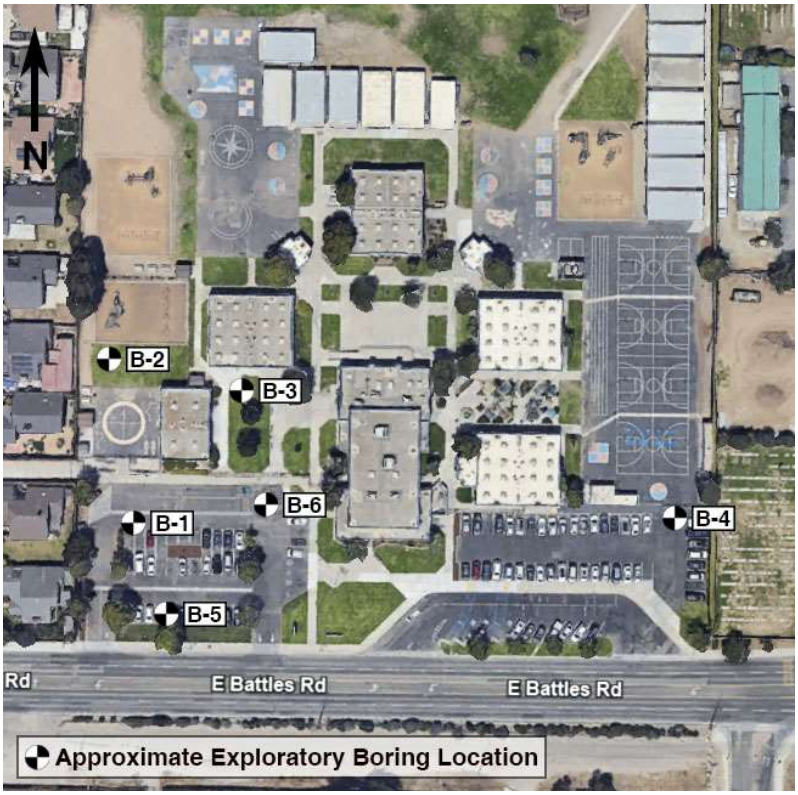

Figure 3: Field Exploration

3.0 FINDINGS

3.1 Geologic Setting

Regional site geology was obtained through review of available geologic maps provided by the USGS National Geologic Map Database (USGS, 2024). Figure 4: Regional Geologic Map provides the surficial geologic units in the project vicinity, as mapped by Dibblee (2009). The surficial geologic units mapped at the Site consist of Surficial Sediments (Qa) described as “valley floodplain alluvium”.

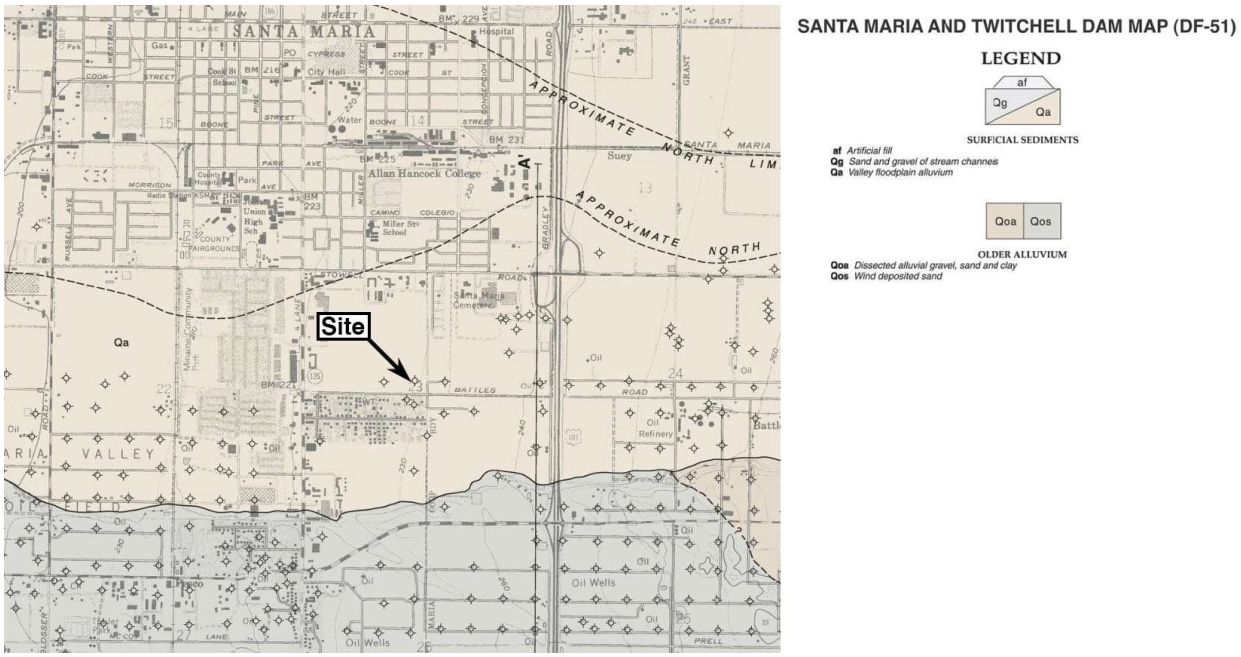

Figure 4: Regional Geologic Map

3.2 Subsurface Conditions

Data gathered during the field exploration indicates that the soil materials at the Site are comprised of interbedded alluvial soils overlying formational material at significant depth. A summary of the conditions encountered is provided below. Refer to **Appendix A** for logs of the borings performed at the Site and Figure 3: Field Exploration for the approximate boring locations.

In general, alluvial materials were encountered in all of the exploratory borings which consisted of varying shades of brown silty SAND (SM), silty SAND with gravel (SM), SAND with silt (SP-SM), poorly graded SAND with silt (SP-SM), well graded SAND with silt (SW-SM), sandy SILT (ML), and clayey SAND (SC). These materials were encountered in slightly moist and loose/firm to dense conditions to approximately 42.5 feet bgs in B-1 and to the termination of borings B-2 through B-6 at depths of 15 feet bgs.

B-1 was terminated at a depth of 49 feet bgs in light yellowish brown SAND (SP) encountered in a dry and very dense condition. This material was interpreted as Orcutt Formation (Qo) based upon the cross section provided on the referenced geologic map by Dibblee (2009).

3.3 Groundwater

Groundwater was not encountered in any of the exploratory borings. Review of historic groundwater data available from Geotracker (State Water Resources Control Board, 2024) indicate groundwater levels of approximately 121-130 feet bgs at the Santa Maria Associates LUST cleanup site which is located approximately 0.4 miles west/northwest of Battles Elementary School. It should be anticipated that groundwater levels may change seasonally and with irrigation practices.

3.4 Engineering Properties

Relevant engineering properties determined from laboratory testing on representative samples obtained in the field exploration are provided in Table 1: Engineering Properties. Refer to **Appendix B** for additional information on the testing performed and laboratory test results.

Table 1: Engineering Properties

Sample ID	Sample Description	USCS Specification	Maximum Dry Density, γ_d (pcf)	Optimum Moisture (%)	Angle of Internal Friction, ϕ (deg.)	Cohesion, c (psf)	Fines Content (%)	Compression Ratio, $C_c/(1+e_0)$	Recompression Ratio, $C_r/(1+e_0)$	R-Value
A (B-1 @ 2-6')	Dark Yellowish Brown Silty SAND	SM	123.3	9.8	-	-	12.2	-	-	-
B-1 @ 4'	Dark Yellowish Brown Silty SAND	-	-	-	39.0	36	-	.030	.004	-
B-1 @ 9'	Olive Brown Sandy SILT	ML	-	-	-	-	53.3	-	-	-
B-1 @ 19'	Yellowish Brown Poorly Graded SAND with Silt	SP-SM	-	-	-	-	7.6	-	-	-
B-1 @ 29'	Light Olive Brown Sandy SILT	ML	-	-	-	-	66.3	-	-	-
B-1 @ 34'	Light Yellowish Brown Well Graded SAND with Silt	SW-SM	-	-		-	11.4	-	-	-
B-1 @ 39'	Light Olive Brown Silty SAND	SM	-	-	-	-	27.6	-	-	-
B-1 @ 44'	Light Yellowish Brown Silty SAND with Gravel (Sandstone)	SM	-	-	-	-	16.8	-	-	-
B-1 @ 48'	Dark Yellowish Brown Silty SAND with Gravel (Sandstone)	SM	-	-	-	-	15.4	-	-	-
B (B-4 @ 1-4')	Dark Yellowish Brown Clayey SAND	SC	131.5	7.5	32.3	146	-	-	-	-
C (B-5 @ 1-4')	Dark Yellowish Brown Silty SAND	CL-ML	-	-		-	-	-	-	23
D (B-2 @ 0.5-5')	Dark Yellowish Brown Silty SAND	SM	Corrosivity Evaluation (See Section 3.5)							

3.5 Corrosion Considerations

The results of corrosivity testing performed on sample D (B-2 @ 0.5 – 5') are presented in Table 2: Results of Corrosivity Testing.

Based on results of resistivity testing, material tested from the Site is classified as "moderately corrosive**".** All buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel or iron should be properly protected against corrosion depending on the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

Refer to **Appendix B** for the corrosivity evaluation provided by CERCO and design considerations pertaining to buried structures and pipelines at the Site.

Table 2: Results of Corrosivity Testing

Sample ID	Sample Location	Sample Description	USCS Specification	Corrosivity Testing				
				Redox (mV)	pH	Resistivity (ohms-cm)	Chloride (mg/kg)	Sulfate (mg/kg)
D	B-2 @ 0.5-5'	Dark Yellowish Brown Silty SAND	SM	250	8.04	4,200	ND	19

* ND – none detected

4.0 SEISMIC DESIGN CONSIDERATIONS

Estimating the design ground motions at the Site depends on many factors including the distance from the Site to known active faults; the expected magnitude and rate of recurrence of seismic events produced on such faults; the source-to-site ground motion attenuation characteristics; and the Site soil profile characteristics. According to section 1613 of the 2022 CBC (CBSC, 2022), all structures and portions of structures should be designed to resist the effects of seismic loadings caused by earthquake ground motions in accordance with the ASCE 7: Minimum Design Loads for Buildings and Other Structures, hereafter referred to as ASCE 7-16 (ASCE, 2016). The Site soil profile classification (Site Class) can be determined by the average soil properties in the upper 100 feet of the Site profile and the criteria provided in Table 20.3-1 of ASCE 7-16.

Spectral response accelerations and peak ground accelerations, provided in this report were obtained using the computer-based Seismic Design Maps tool available from the Structural Engineers Association of California (SEAOC, 2019). This program utilizes the methods developed in ASCE 7-16 in conjunction with user-inputted Site location to calculate seismic design parameters and response spectra (both for period and displacement) for soil profile Site Classes A through E.

Site coordinates of 34.9319 degrees north latitude and -120.4287 degrees east longitude were used in the web-based probabilistic seismic hazard analysis (SEAOC, 2019). Based on the results from the in-situ tests performed during the field exploration, the Site was defined as **Site Class D**, "Stiff Soil" profile per ASCE 7-16, Chapter 20. Relevant seismic design parameters obtained from the program are summarized in Table 3: Seismic Design Parameters.

Table 3: Seismic Design Parameters

Site Class	D – Stiff Soil
Structure Risk Category	III
Short-Period Design Spectral Response Acceleration, S_{DS}	0.716 g
1-Second Period Design Spectral Response Acceleration, S_{D1}	*
Site Specific MCE Peak Ground Acceleration, PGA_M	0.498 g

** In accordance with ASCE 7-16, SUPPLEMENT 3, Section 11.4.8.1: A ground motion hazard analysis is not required for structures on Site Class D sites with S_1 greater than or equal to 0.2, where the value of the parameter S_{M1} determined by Eq. (11.4-2) is increased by 50% for all applications of S_{M1} in this Standard. The resulting value of the parameter S_{D1} determined by Eq. (11.4-4) shall be used for all applications of S_{D1} in this Standard.*

5.0 SEISMIC HAZARD ASSESSMENT

5.1 Liquefaction

Liquefaction occurs when saturated cohesionless soils lose shear strength due to earthquake shaking. Ground motion from an earthquake may induce cyclic reversals of shear stresses of large amplitude. Lateral and vertical movement of the soil mass combined with the loss of bearing strength can result from this phenomenon. Liquefaction potential of soil deposits during earthquake activity depends on soil type, void ratio, groundwater conditions, the duration of shaking, and confining pressures on the potentially liquefiable soil unit. Fine, poorly graded loose sand, shallow groundwater, high intensity earthquakes, and long duration of ground shaking are the principal factors leading to liquefaction.

Due to the absence of groundwater during the field exploration and nearby historical groundwater depths in excess of 120 feet, the potential for seismic liquefaction of soils at the Site is considered to be low.

5.2 Seismic Settlement of Dry Sand

Loose sand layers may densify during seismic events and result in vertical settlement. The potential for seismic settlement of dry sand was estimated using the methodology of Tokimatsu and Seed (1986), as implemented through the computer program LiquefyPro (2020). Based on our analysis, densification of loose sand layers manifesting as vertical settlements up to approximately 1 inch at the ground surface may be anticipated.

Assuming that the recommendations of the Soils Engineering Report are implemented, the potential for seismically induced settlement and differential settlement at the Site is considered to be low.

6.0 GENERAL SOIL-FOUNDATION DISCUSSION

It is anticipated that a graded pad will be constructed for the proposed TK/K building with all foundations excavated into engineered fill. All foundations are to be excavated into uniform material to limit the potential for distress of the foundation systems due to differential settlement. If cuts steeper than allowed by State of California Construction Safety Orders for “Excavations, Trenches, Earthwork” are proposed, a numerical slope stability analysis may be necessary for temporary construction slopes.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The Site is suitable for the proposed development provided the recommendations presented in this report are incorporated into the project plans and specifications.

The primary geotechnical concerns at the Site are:

1. The potential for loose material, concentrations of organic material, and non-native debris in the near-surface soils.

2. The presence of existing utilities and surface improvements.

3. The potential for differential settlement occurring between foundations supported on soil materials having different settlement characteristics, such as native material and engineered fill. Therefore, it is important that all of the foundations are founded in equally competent uniform material in accordance with this report.

7.1 Site Preparation

1. It is anticipated that a graded engineered fill pad will be developed for the proposed TK/K building with footings founded in engineered fill.

2. For the development of an engineered fill pad, the on-site material should be over-excavated a minimum of 4 feet below existing grade, 2 feet below the bottom of footings, to medium dense native material, or to two-thirds the depth of the deepest fill (measured from the bottom of the deepest footing); whichever is greatest. The limits of over-excavation should extend a minimum of 5 feet beyond the perimeter foundation.

3. The exposed surface at the bottom of the over-excavation should be scarified to a depth of 6-inches, moisture conditioned to slightly over optimum moisture content, and compacted to a minimum relative compaction of 90 percent (ASTM D1557).

4. The over-excavated material may be used as engineered fill provided it is processed to remove oversized material and concentrations of organic material. Engineered fill should be moisture conditioned to slightly over optimum moisture content and compacted to a minimum relative compaction of 90 percent (ASTM D1557).

5. The ground immediately adjacent to the foundation shall be sloped away from the structure at a slope of not less than one unit vertical in 20 units horizontal (5 percent slope) for a minimum distance of 10 feet measured perpendicular to the face of the wall per Section 1804.4 of the 2022 CBC.

7.2 Conventional Foundations

1. Conventional continuous and spread footings with grade beams may be used for support of the proposed structure.

2. Minimum footing sizes and depths in engineered fill should conform to the following table, as observed and approved by a representative of GeoSolutions, Inc.

Table 4: Minimum Footing Recommendations

	Perimeter Footings
Minimum Width	15 inches (one story)
Embedment Depth	15 inches (one story)
Minimum Reinforcing*	4 #4 bars (2 top / 2 bottom)
* Steel should be held in place by stirrups at appropriate spacing to ensure proper positioning of the steel (see WRI Design of Slab-on-Ground Foundations and ACI 318, Section 26.6.6 – Placing Reinforcement).	

3. Minimum reinforcing for footings should conform to the recommendations provided in Table 4: Minimum Footing Recommendations which meets the specifications of Section 1808.6 of the 2022 California Building Code for the soil conditions at the Site. Reinforcing steel should be held in place by stirrups at appropriate spacing to ensure proper positioning of the steel in accordance with WRI Design of Slab-on-Ground Foundations, and ACI 318, Section 26.6.6 – Placing Reinforcement.

4. An allowable dead plus live load bearing pressure of **2,400 psf** may be used for the design of footings founded in engineered fill.

5. Allowable bearing capacities may be increased by one-third when transient loads such as wind or seismicity are included.

6. A total settlement of less than 1 inch and a differential settlement of less than 1 inch in 30 feet are anticipated.

7. Lateral forces on structures may be resisted by passive pressure acting against the sides of shallow footings and/or friction between the engineered fill and the bottom of the footings. For resistance to lateral loads, a friction factor of **0.40** may be utilized for sliding resistance at the base of footings extending a minimum of 15 inches into engineered fill. A passive pressure of **375-pcf** equivalent fluid weight may be used against the side of shallow footings in engineered fill. If friction and passive pressures are combined to resist lateral forces acting on shallow footings, the lesser value should be reduced by 50 percent.

8. Foundation design should conform to the requirements of Chapter 18 of the latest edition of the CBC (CBSC, 2022).

9. The base of all grade beams and footings should be level and stepped as required to accommodate any change in grade while still maintaining the minimum required footing embedment and slope setback distance.

10. Foundation excavations should be observed and approved by a representative of this firm prior to the placement of formwork, reinforcing steel and/or concrete.

11. Concrete should be placed only in excavations that are free of loose, soft soil and debris and that have been lightly pre-moistened, with no associated testing required.

7.3 Slab-On-Grade Construction

1. Concrete slabs-on-grade and flatwork should not be placed directly on unprepared native materials. Preparation of sub-grade to receive concrete slabs-on-grade and flatwork should be processed as discussed in the preceding sections of this report. Concrete slabs should be placed only over sub-grade that is free of loose, soft soil and debris and that has been lightly pre-moistened, with no associated testing required.

2. Concrete slabs-on-grade should be in conformance with the recommendations provided in Table 5: Minimum Slab Recommendations. Reinforcing should be placed on-center both ways at or slightly above the center of the structural section. Reinforcing bars should have a minimum clear cover of 1.5 inches. Where lapping of the slab steel is required, laps in adjacent bars should be staggered. The recommended reinforcement may be used for anticipated uniform floor loads not exceeding 200 psf. If floor loads greater than 200 psf are anticipated, a Structural Engineer should evaluate the slab design.

Table 5: Minimum Slab Recommendations

Minimum Thickness	5 inches
Reinforcing*	#4 bars at 18 inches on-center each way
* Where lapping of the slab steel is required, laps in adjacent bars should be staggered	

3. Concrete for all slabs should be placed at a maximum slump of less than 5 inches. Excessive water content is the major cause of concrete cracking. If fibers are used to aid in the control of cracking, a water-reducing admixture may be added to the concrete to increase slump while maintaining a water/cement ratio, which will limit excessive shrinkage. Control joints should be constructed as required to control cracking.

4. Where concrete slabs-on-grade are to be constructed for interior conditioned spaces, the slabs should be underlain by a minimum of four inches of clean free-draining material, such as a ¾ inch coarse aggregate mix, to serve as a cushion and a capillary break. The gravel should be consolidated with a vibratory plate prior to membrane placement. Where moisture susceptible storage or floor coverings are anticipated, a 15-mil Stego Wrap membrane (or equivalent installed per manufacturer's specifications) should be placed between the free-draining material and the slab to minimize moisture condensation under the floor covering. See Figure 5: Sub-Slab Detail for the placement of under-slab drainage material. It is suggested, but not required, that a two-inch thick sand layer be placed on top of the membrane to assist in the curing of the concrete, increasing the depth of the under-slab material to a total of six inches. The sand should be lightly moistened prior to placing concrete.

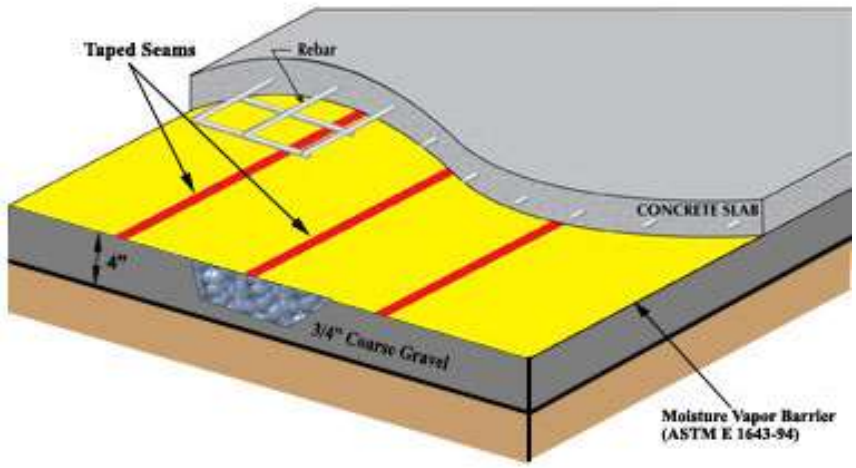

Figure 5: Sub-Slab Detail

5. It should be noted that for a vapor barrier installation to conform to manufacturer's specifications, sealing of penetrations, joints and edges of the vapor barrier membrane are typically required. As required by the California Building Code, joints in the vapor barrier should be lapped a minimum of 6 inches. If the installation is not performed in accordance with the manufacturer's specifications, there is an increased potential for water vapor to affect the concrete slabs and floor coverings.

6. The most effective method of reducing the potential for moisture vapor transmission through concrete slabs-on-grade would be to place the concrete directly on the surface of the vapor barrier membrane. However, this method requires a concrete mix design specific to this application with low water-cement ratio in addition to special concrete finishing and

curing practices, to minimize the potential for concrete cracks and surface defects. The contractor should be familiar with current techniques to finish slabs poured directly onto the vapor barrier membrane.

7. Moisture condensation under floor coverings has become critical due to the use of water-soluble adhesives. Therefore, it is suggested that moisture sensitive slabs not be constructed during inclement weather conditions.

7.4 Retaining Walls

1. Retaining walls should be designed to resist lateral pressures from adjacent soils and surcharge loads applied behind the walls. We recommend using the lateral pressures presented in Table 6: Retaining Wall Design Parameters and Figure 6: Retaining Wall Detail for the design of retaining walls at the Site. The Active Case may be used for the design of unrestrained retaining walls, and the At-Rest Case may be used for the design of restrained retaining walls.

Table 6: Retaining Wall Design Parameters

Lateral Pressure and Condition	Equivalent Fluid Pressure, pcf
Static, Active Case, Engineered Fill ($\gamma' K_A$)	40
Static, At-Rest Case, Engineered Fill ($\gamma' K_O$)	60
Static, Passive Case, Engineered Fill ($\gamma' K_P$)	375

2. The above values for equivalent fluid pressure are based on retaining walls having level retained surfaces, having an approximately vertical surface against the retained material, and retaining granular backfill material or engineered fill composed of native soil within the active wedge. See Figure 6: Retaining Wall Detail and Figure 7: Retaining Wall Active and Passive Wedges for a description of the location of the active wedge behind a retaining wall.

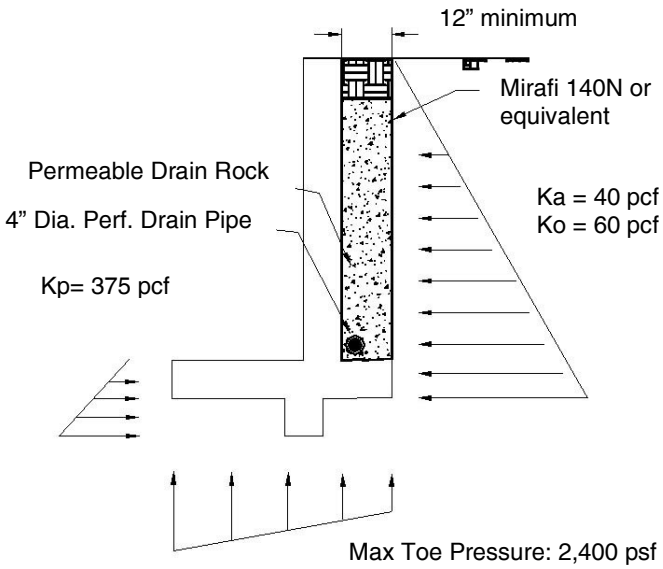

Figure 6: Retaining Wall Detail

3. Proposed retaining walls having a retained surface that slopes upward from the top of the wall should be designed for an

additional equivalent fluid pressure of 1 pcf for the active case and 1.5 pcf for the at-rest case, for every degree of slope inclination.

4. We recommend that the proposed retaining walls at the Site have an approximately vertical surface against the retained material. If the proposed retaining walls are to have sloped surfaces against the retained material, the project designers should contact the Soils Engineer to determine the appropriate lateral earth pressure values for retaining walls located at the Site.

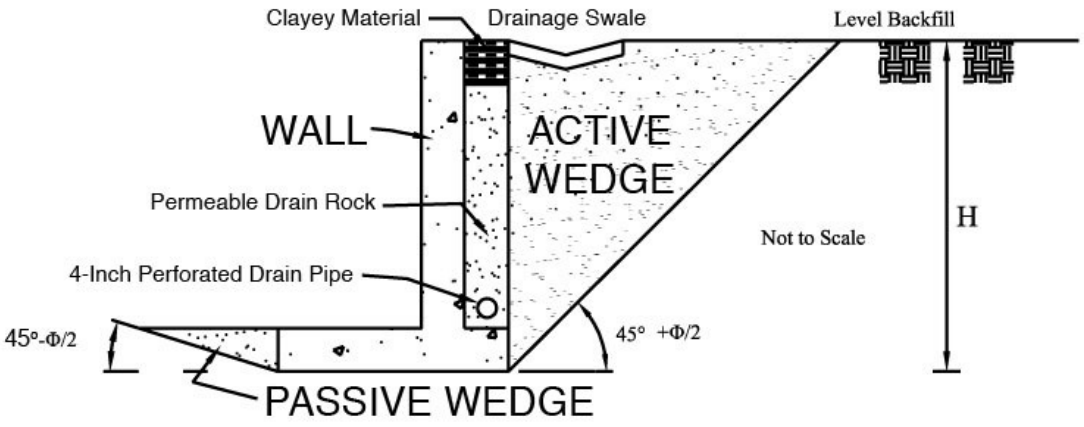

Figure 7: Retaining Wall Active and Passive Wedges

5. Retaining wall foundations should be founded a minimum of 15 inches below lowest adjacent grade in engineered fill as observed and approved by a representative of GeoSolutions, Inc. A coefficient of friction of **0.40** may be used between engineered fill and concrete footings. Project designers may use a maximum toe pressure of **2,400 psf** for the design of retaining wall footings founded in engineered fill.

6. For earthquake conditions, retaining walls greater than 6 feet in height should be designed to resist an additional seismic lateral soil pressure of **20 pcf** equivalent fluid pressure for unrestrained walls (active condition). The pressure resultant force from earthquake loading should be assumed to act a distance of $^1/_3H$ above the base of the retaining wall, where *H* is the height of the retaining wall. Seismic active lateral earth pressure values were determined using the simplified dynamic lateral force component (SEAOC 2010) utilizing the design peak ground acceleration, PGA_M, discussed in Section 4.0 (**PGA_M = 0.498g**). The dynamic increment in lateral earth pressure due to earthquakes should be considered during the design of retaining walls at the Site. Based on research presented by Dr. Marshall Lew (Lew et al., 2010), lateral pressures associated with seismic forces should not be applied to restrained walls (at-rest condition).

7. Seismically induced forces on retaining walls are considered to be short-term loadings. Therefore, when performing seismic analyses for the design of retaining wall footings, we recommend that the allowable bearing pressure and the passive pressure acting against the sides of retaining wall footings be increased by a factor of one-third.

8. In addition to the static lateral soil pressure values reported in Table 6: Retaining Wall Design Parameters, the retaining walls at the Site should be designed to support any design live load, such as from vehicle and construction surcharges, etc., to be supported by the wall backfill. If construction vehicles are required to operate within 10 feet of a

retaining wall, supplemental pressures will be induced and should be taken into account in the design of the retaining wall.

9. The recommended lateral earth pressure values are based on the assumption that sufficient sub-surface drainage will be provided behind the walls to prevent the build-up of hydrostatic pressure. To achieve this we recommend that a granular filter material be placed behind all proposed walls. The blanket of granular filter material should be a minimum of 12 inches thick and should extend from the bottom of the wall to 12 inches from the ground surface. The top 12 inches should consist of moisture conditioned, compacted, clayey soil. Neither spread nor wall footings should be founded in the granular filter material used as backfill.

10. A 4-inch diameter perforated or slotted drainpipe (ASTM D1785 PVC) should be installed near the bottom of the filter blanket with perforations facing down. The drainpipe should be underlain by at least 4 inches of filter type material and should daylight to discharge in suitably projected outlets with adequate gradients. The filter material should consist of a clean free-draining aggregate, such as a coarse aggregate mix. If the retaining wall is part of a structural foundation, the drainpipe must be placed below finished slab sub-grade elevation.

11. The filter material should be encapsulated in a permeable geotextile fabric. A suitable permeable geotextile fabric, such as non-woven needle-punched Mirafi 140N or equal, may be utilized to encapsulate the retaining wall drain material and should conform to Caltrans Standard Specification 88-1.03 for underdrains.

12. For hydrostatic loading conditions (i.e. no free drainage behind retaining wall), an additional loading of 45-pcf equivalent fluid weight should be added to the active and at-rest lateral earth pressures. If it is necessary to design retaining structures for submerged conditions, the allowed bearing and passive pressures should be reduced by 50 percent. In addition, soil friction beneath the base of the foundations should be neglected.

13. Precautions should be taken to ensure that heavy compaction equipment is not used adjacent to walls, so as to prevent undue pressure against, and movement of the walls.

14. The use of water-stops/impermeable barriers should be used for any basement construction, and for building walls that retain earth. Damproofing and waterproofing shall meet the minimum standards of Section 1805 of the 2022 California Building Code.

7.5 Preparation of Paved Areas

1. Pavement areas should be excavated to approximate sub-grade elevation or to competent material; whichever is deeper. The exposed surface should be scarified an additional depth of 12 inches, moisture conditioned to slightly above optimum moisture content, and compacted to a minimum relative compaction of 95 percent (ASTM D1557 test method).

2. The top 12 inches of sub-grade soil under all pavement sections should be compacted to a minimum relative compaction of 95 percent based on the ASTM D1557 test method at slightly above optimum.

3. Sub-grade soils should not be allowed to dry out or have excessive construction traffic between moisture conditioning and compaction, and placement of the pavement structural section.

7.6 Pavement Design

1. All paving construction and materials used should conform to applicable sections of the

latest edition of the State of California Department of Transportation Standard Specifications.

2. As indicated previously, the top 12 inches of sub-grade soil under asphaltic concrete pavement sections should be compacted to a minimum relative compaction of 95 percent based on the ASTM D1557 test method at slightly above optimum moisture content. Aggregate bases and sub-bases should also be compacted to a minimum relative compaction of 95 percent based on the aforementioned test method.

3. The following table provides recommended Hot Mix Asphalt (HMA) pavement sections For traffic indexes of 4.0, 5.0 and 6.0 based on a subgrade **R-Value of 23**.

4. All pavement sections should be crowned for good drainage. All pavement construction and materials used should conform to Sections 25, 26 and 39 of the latest edition of the State of California Department of Transportation Standard Specifications.

Table 7: Recommended Pavement Structural Sections

Traffic Index	Section Thickness (inches)	
	HMA	AB
4.0	2.0	6.5
	2.5	6.0
5.0	2.0	9.0
	3.0	7.0
6.0	2.0	12.0
	3.0	10.0
HMA = Hot Mix Asphalt meeting Caltrans Specification HMA Type A ½ inch mix AB = Aggregate Base meeting Caltrans Specification for Class 2 aggregate base (R-Value = 78 Min)		

8.0 ADDITIONAL GEOTECHNICAL SERVICES

The recommendations contained in this report are based on a limited number of borings and on the continuity of the sub-surface conditions encountered. GeoSolutions, Inc. assumes that it will be retained to provide additional services during future phases of the proposed project. These services would be provided by GeoSolutions, Inc. as required by the City of Santa Maria, the 2022 CBC, and/or industry standard practices. These services would be in addition to those included in this report and would include, but are not limited to, the following services:

1. Consultation during plan development.

2. Plan review of grading and foundation documents prior to construction and a report certifying that the reviewed plans are in conformance with our geotechnical recommendations.

3. Construction inspections and testing, as required, during all grading and excavating operations beginning with the stripping of vegetation at the Site, at which time a site meeting or pre-job meeting would be appropriate.

4. Special inspection services during construction of reinforced concrete, structural masonry, high strength bolting, epoxy embedment of threaded rods and reinforcing steel, and welding of structural steel.

5. Preparation of construction reports certifying that building pad preparation and foundation excavations are in conformance with our geotechnical recommendations.

6. Preparation of special inspection reports as required during construction.

7. In addition to the construction inspections listed above, section 1705.6 of the 2022 CBC (CBSC, 2022) requires the following inspections by the Soils Engineer for controlled fill thicknesses greater than 12 inches as shown in Table 8: Required Special Inspections and Tests of Soils:

Table 8: Required Special Inspections and Tests of Soils

Verification and Inspection Task	Continuous During Task Listed	Periodically During Task Listed
1. Verify materials below footings are adequate to achieve the design bearing capacity.	-	X
2. Verify excavations are extended to proper depth and have reached proper material.	-	X
3. Perform classification and testing of controlled fill materials.	-	X
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.	X	-
5. Prior to placement of controlled fill, observe sub-grade and verify that site has been prepared properly.	-	X

9.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed during our study. Should any variations or undesirable conditions be encountered during the development of the Site, GeoSolutions, Inc. should be notified immediately and GeoSolutions, Inc. will provide supplemental recommendations as dictated by the field conditions.

2. This report is issued with the understanding that it is the responsibility of the owner or his/her representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project, and incorporated into the project plans and specifications. The owner or his/her representative is responsible to ensure that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. As of the present date, the findings of this report are valid for the property studied. With the passage of time, changes in the conditions of a property can occur whether they are due to natural processes or to the works of man on this or adjacent properties. Therefore, this report should not be relied upon after a period of 3 years without our review nor should it be used or is it applicable for any properties other than those studied. However many events such as floods, earthquakes, grading of the adjacent properties and building and municipal code changes could render sections of this report invalid in less than 3 years.

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REFERENCES

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APPENDIX A

Field Exploration

Soil Classification Chart

Boring Logs

FIELD EXPLORATION

The field exploration was conducted on April 4th and 5th, 2024 using a CME-55 drill rig a Mobile B-24 drill rig. The surface and sub-surface conditions were studied by advancing six (6) exploratory borings. This exploration was conducted in accordance with presently accepted geotechnical engineering procedures consistent with the scope of the services authorized to GeoSolutions, Inc.

Utilizing a Mobile B-24 drill rig equipped with a 6-inch diameter solid-stem continuous flight auger and a CME-55 drill rig equipped with an 8-inch diameter hollow-stem continuous flight auger, six (6) exploratory borings were advanced near the approximate locations indicated on Figure 3: Field Exploration. The drilling and field observation were performed under the direction of the project engineer. A representative of GeoSolutions, Inc. maintained a log of the soil conditions and obtained soil samples suitable for laboratory testing. The soils were classified in accordance with the Unified Soil Classification System. See the Soil Classification Chart in this appendix.

Standard Penetration Tests with a two-inch outside diameter standard split tube sampler (SPT) without liners (ASTM D1586) and a three-inch outside diameter Modified California (CA) split tube sampler with liners (ASTM D3550) were performed to obtain field indication of the in-situ density of the soil and to allow visual observation of at least a portion of the soil column. Soil samples obtained with the split spoon sampler are retained for further observation and testing. The split spoon samples are driven by a 140-pound hammer free falling 30 inches. The sampler is initially seated six inches to penetrate any loose cuttings and is then driven an additional 12 inches with the results recorded in the boring logs as N-values, which area the number of blows per foot required to advance the sample the final 12 inches.

The CA sampler is a larger diameter sampler than the standard (SPT) sampler with a two-inch outside diameter and provides additional material for normal geotechnical testing such as in-situ shear and consolidation testing. Either sampler may be used in the field investigation, but the N-values obtained from using the CA sampler will be greater than that of the SPT. The N-values for samples collected using the CA can be roughly correlated to SPT N-values using a conversion factor that may vary from about 0.5 to 0.7. A commonly used conversion factor is 0.67 (2/3). More information about standardized samplers can be found in ASTM D1586 and ASTM D3550.Disturbed bulk samples are obtained from cuttings developed during boring operations. The bulk samples are selected for classification and testing purposes and may represent a mixture of soils within the noted depths. Recovered samples are placed in transport containers and returned to the laboratory for further classification and testing.

Logs of the borings showing the approximate depths and descriptions of the encountered soils, applicable geologic structures, recorded N-values, and the results of laboratory tests are presented in this appendix. The logs represent the interpretation of field logs and field tests as well as the interpolation of soil conditions between samples. The results of laboratory observations and tests are also included in the boring logs. The stratification lines recorded in the boring logs represent the approximate boundaries between the surface soil types. However, the actual transition between soil types may be gradual or varied.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS		LABORATORY CLASSIFICATION CRITERIA		GROUP SYMBOLS	PRIMARY DIVISIONS
COARSE GRAINED SOILS More than 50% retained on No. 200 sieve	GRAVELS More than 50% of coarse fraction retainined on No. 4 (4.75mm) sieve	Clean gravels (less than 5% fines*)	C_u greater than 4 and C_z between 1 and 3	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			Not meeting both criteria for GW	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravel with fines (more than 12% fines*)	Atterberg limits plot below "A" line or plasticity index less than 4	GM	Silty gravels, gravel-sand-silt mixtures
			Atterberg limits plot below "A" line and plasticity index greater than 7	GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 (4.75mm) sieve	Clean sand (less than 5% fines*)	C_u greater than 6 and C_z between 1 and 3	SW	Well graded sands, gravely sands, little or no fines
			Not meeting both criteria for SW	SP	Poorly graded sands and gravelly and sands, little or no fines
		Sand with fines (more than 12% fines*)	Atterberg limits plot below "A" line or plasticity index less than 4	SM	Silty sands, sand-silt mixtures
			Atterberg limits plot above "A" line and plasticity index greater than 7	SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS 50% or more passes No. 200 sieve	SILTS AND CLAYS (liquid limit less than 50)	Inorganic soil	PI < 4 or plots below "A"-line	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
		Inorganic soil	PI > 7 and plots on or above "A" line**	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		Organic Soil	LL (oven dried)/LL (not dried) < 0.75	OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS (liquid limit 50 or more)	Inorganic soil	Plots below "A" line	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		Inorganic soil	Plots on or above "A" line	CH	Inorganic clays of high plasticity, fat clays
		Organic Soil	LL (oven dried)/LL (not dried) < 0.75	OH	Organic silts and organic clays of high plasticity
Peat	Highly Organic	Primarily organic matter, dark in color, and organic odor		PT	Peat, muck and other highly organic soils

*Fines are those soil particles that pass the No. 200 sieve. For gravels and sands with between 5 and 12% fines, use of dual symbols is required (I.e. GW-GM, GW-GC, GP-GM, or GP-GC).

**If the plasticity index is between 4 and 7 and it plots above the "A" line, then dual symbols (I.e. CL-ML) are required.

the "A" line, then dual symbols (I.e. CL-ML) are required.

CONSISTENCY

CLAYS AND PLASTIC SILTS	STRENGTH TON/SQ. FT ++	BLOWS/ FOOT +
VERY SOFT	0 - 1/4	0 - 2
SOFT	1/4 - 1/2	2 - 4
FIRM	1/2 - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	Over 4	Over 32

RELATIVE DENSITY

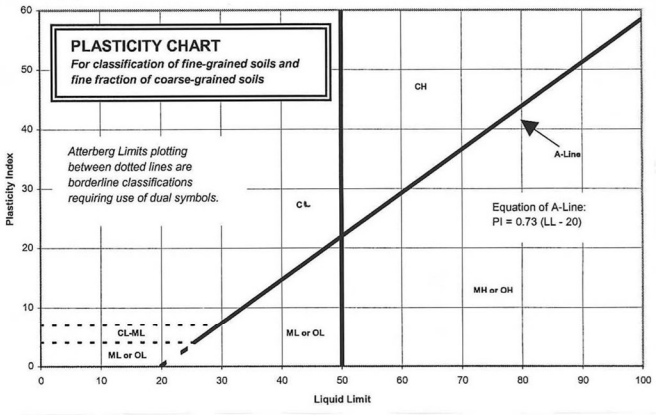
SANDS, GRAVELS AND NON-PLASTIC SILTS	BLOWS/ FOOT +
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	Over 50

+ Number of blows of a 140-pound hammer falling 30-inches to drive a 2-inch O.D. (1-3/8-inch I.D.) split spoon (ASTM D1586).

++ Unconfined compressive strength in tons/sq.ft. as determined by laboratory testing or approximated by the standard penetration test (ASTM D1586), pocket penetrometer, torvane, or visual observation.

CLASSIFICATIONS BASED ON PERCENTAGE OF FINES

Less than 5%, Pass No. 200 (75mm)sieve — GW, GP, SW, SP
More than 12% Pass N. 200 (75 mm) sieve — GM, GC, SM, SC
5%-12% Pass No. 200 (75 mm) sieve — Borderline Classification requiring use of dual symbols



Drilling Notes:

1. Sampling and blow counts
   a. California Modified – number of blows per foot of a 140 pound hammer falling 30 inches
   b. Standard Penetration Test – number of blows per 12 inches of a 140 pound hammer falling 30 inches

Types of Samples:
X – Sample
SPT - Standard Penetration
CA - California Modified
N - Nuclear Gauge
PO – Pocket Penetrometer (tons/sq.ft.)

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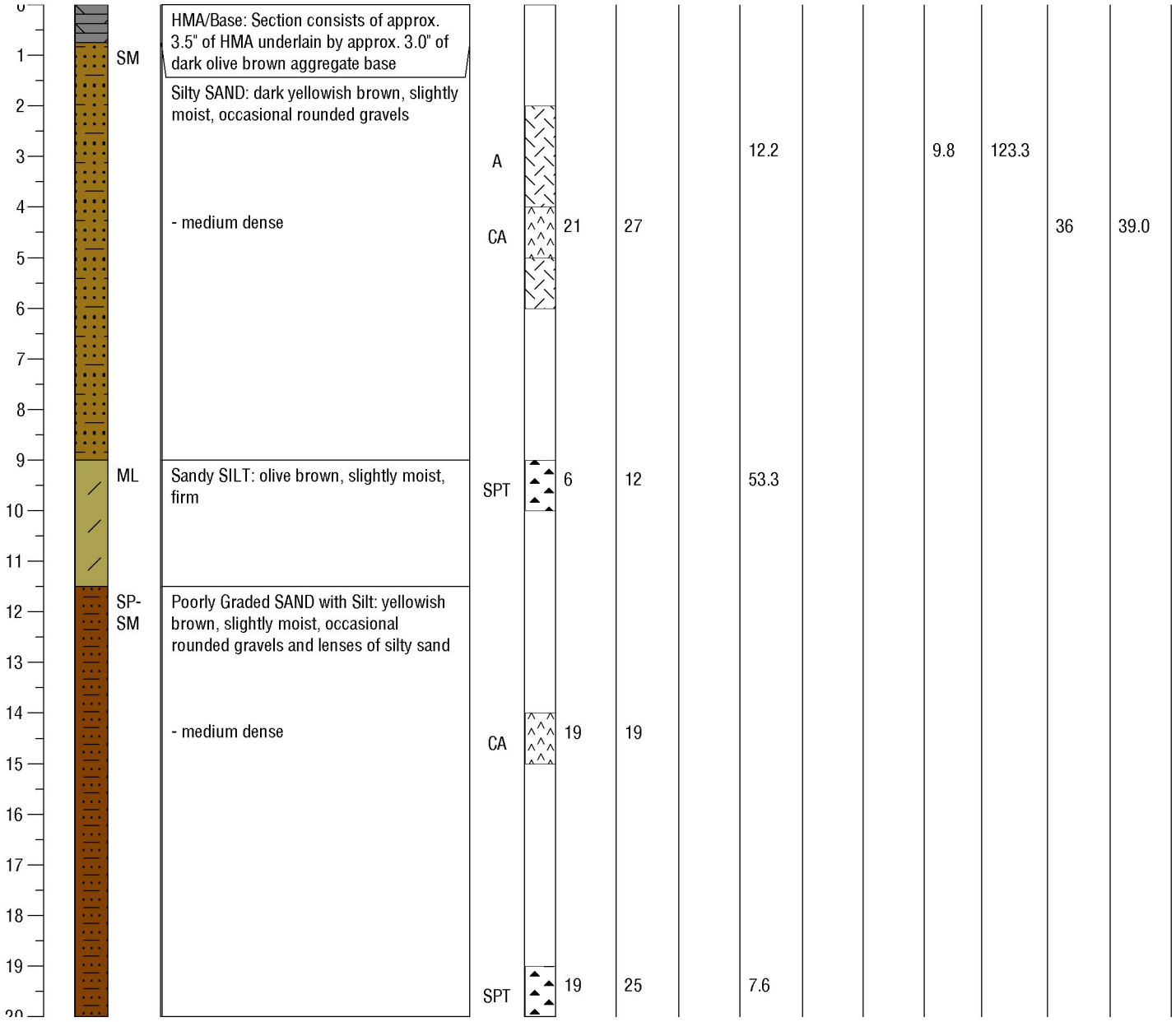
201 S. Milpas St, Ste 103, Santa Barbara, CA 93103
Phone: 805-966-2200

BORING LOG

BORING NO. B-1
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**CME-55**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**8 Inches**
DATE DRILLED:	**April 4, 2024**	SAMPLING METHOD:	**SPT, CA, Bulk**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 229' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **49 Feet**



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PROJECT INFORMATION

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DRILLING LOCATION:	**See Figure 3: Field Exploration**
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LOGGED BY:	**B. Jagger**

DRILLING INFORMATION

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APPROX. ELEVATION:	**Approx. 229' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **49 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLER'S TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
21		SP-SM	Poorly Graded SAND with Silt: yellowish brown, slightly moist, occasional rounded gravels and lenses of silty sand												
22															
23															
24			- dense	CA		34	30								
25															
26															
27															
28															
29															
30		ML	Sandy SILT: light olive brown, slightly moist, 6" lense in SPT, firm	SPT		6	6		66.3						
31		SW-SM	Well Graded SAND with Silt: light yellowish brown, slightly moist												
32															
33															
34			- medium dense	SPT		20	23		11.4						
35															
36															
37															
38															
39		SM	Silty SAND: light olive brown, slightly moist, medium dense	SPT		15	16		27.6						
40															

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BORING LOG

BORING NO. B-1
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**CME-55**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**8 Inches**
DATE DRILLED:	**April 4, 2024**	SAMPLING METHOD:	**SPT, CA, Bulk**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 229' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **49 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
41		SM	Silty SAND: light olive brown, slightly moist, medium dense												
42															
43		SP	Poorly Graded SAND: light yellowish brown, dry - Orcutt Formation (Qo)												
44				SPT		74	75		16.8						
45			- very dense												
46															
47			- cobbles												
48				SPT		85	81		15.4						
49															
50															

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Phone: 805-966-2200

BORING LOG

BORING NO. B-2
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**Mobile B-24**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**6 Inches**
DATE DRILLED:	**April 4, 2024**	SAMPLING METHOD:	**SPT, CA**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 230' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **15 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0			Grass: grass/roots												
1		SM	Silty SAND: very dark brown, slightly moist												
2			- dark yellowish brown	D											
3															
4															
5			- medium dense	SPT		18	24								
6			- rounded gravels												
7			- yellowish brown												
8															
9				CA		38	29								
10															
11															
12															
13															
14				SPT		10	10								
15															
16															
17															
18															
19															
20															

GEO SOLUTIONS
220 High Street, San Luis Obispo, CA 93401
Phone: 805-543-8539
1021 Tama Lane, Ste 105, Santa Maria, CA 93455
Phone: 805-614-6333
201 S. Milpas St, Ste 103, Santa Barbara, CA 93103
Phone: 805-966-2200

BORING LOG

BORING NO. B-3
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**Mobile B-24**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**6 Inches**
DATE DRILLED:	**April 4, 2024**	SAMPLING METHOD:	**SPT**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 230' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **15 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0			Grass: grass/roots												
1		SM	Silty SAND: dark yellowish brown, slightly moist												
2															
3															
4		SM	Silty SAND with Gravel: yellowish brown, slightly moist, medium dense		SPT	20	27								
5															
6															
7															
8															
9			- light olive brown, medium dense		SPT	16	18								
10															
11															
12															
13															
14			- loose		SPT	9	9								
15															
16															
17															
18															
19															
20															

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Phone: 805-966-2200

BORING LOG

BORING NO. B-4
JOB NO. GS00433-1

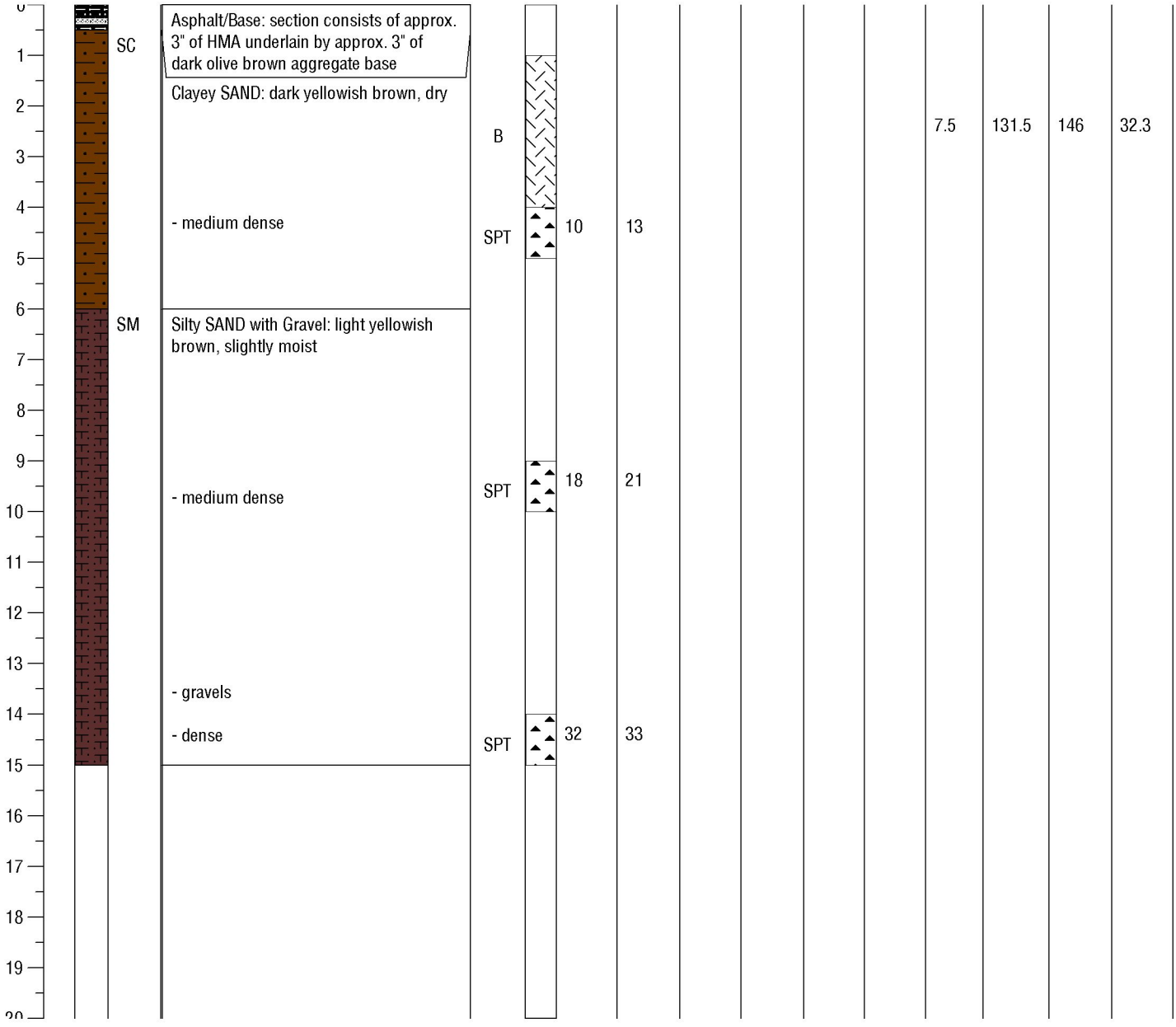
PROJECT INFORMATION

PROJECT:	**New TK/K Building - Battles Elementary**
DRILLING LOCATION:	**See Figure 3: Field Exploration**
DATE DRILLED:	**April 4, 2024**
LOGGED BY:	**B. Jagger**

DRILLING INFORMATION

DRILL RIG:	**Mobile B-24**
HOLE DIAMETER:	**6 Inches**
SAMPLING METHOD:	**SPT, Bulk**
APPROX. ELEVATION:	**Approx. 231' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **15 Feet**



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Phone: 805-966-2200

BORING LOG

BORING NO. B-5
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**Mobile B-24**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**6 Inches**
DATE DRILLED:	**April 5, 2024**	SAMPLING METHOD:	**SPT**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 230' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **15 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0			Asphalt/Base: section consists of approx. 3.5" of HMA underlain by approx. 3" of dark olive brown aggregate base												
1		SM	Silty SAND: dark yellowish brown, slightly moist												
2															
3				C											
4		SP-SM	SAND with Silt: yellowish brown, slightly moist, medium dense	SPT		16	21								
5															
6															
7															
8			- cobble												
9			- loose	SPT		9	10								
10		ML	Sandy SILT: dark yellowish brown, slightly moist												
11															
12															
13															
14		SP-SM	Poorly Graded SAND with Silt: yellowish brown, occasional gravels, slightly moist, medium dense	SPT		19	20								
15															
16															
17															
18															
19															
20															

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Phone: 805-966-2200

BORING LOG

BORING NO. B-6
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**Mobile B-24**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**6 Inches**
DATE DRILLED:	**April 5, 2024**	SAMPLING METHOD:	**SPT**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 230' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **15 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0			Asphalt/Base: section consists of approx. 3.5" of HMA underlain by approx. 3" of dark olive brown aggregate base												
1		SM	Silty SAND: dark yellowish brown, slightly moist												
2															
3															
4		SP-SM	SAND with Silt: yellowish brown, slightly moist, medium dense	SPT		24	32								
5															
6															
7															
8															
9				CA		13	10								
10		ML	Sandy SILT: dark yellowish brown, slightly moist												
11															
12															
13															
14		SP-SM	Poorly Graded SAND with Silt: yellowish brown, occasional gravels, slightly moist, medium dense	SPT		20	21								
15															
16															
17															
18															
19															
20															

APPENDIX B

Laboratory Testing

Soil Test Reports

LABORATORY TESTING

This appendix includes a discussion of the test procedures and the laboratory test results performed as part of this exploration. The purpose of the laboratory testing is to assess the engineering properties of the soil materials at the Site. The laboratory tests are performed using the currently accepted test methods, when applicable, of the American Society for Testing and Materials (ASTM).

Undisturbed and disturbed bulk samples used in the laboratory tests are obtained from various locations during the course of the field exploration, as discussed in **Appendix A** of this report. Each sample is identified by sample letter and depth. The Unified Soils Classification System is used to classify soils according to their engineering properties. The various laboratory tests performed are described below:

Corrosivity Testing (ASTM D1498, D4972, G57, D4327) was performed by CERCO Analytical of Concord, CA. Testing included redox, pH, resistivity, chloride and sulfate. Results are provided in this appendix as well as an analysis of the test results provided by CERCO.

Direct Shear Tests of Soils Under Consolidated Drained Conditions (ASTM D3080) is performed on undisturbed and remolded samples representative of the foundation material. The samples are loaded with a predetermined normal stress and submerged in water until saturation is achieved. The samples are then sheared horizontally at a controlled strain rate allowing partial drainage. The shear stress on the sample is recorded at regular strain intervals. This test determines the resistance to deformation, which is shear strength, inter-particle attraction or cohesion c, and resistance to interparticle slip called the angle of internal friction ϕ.

Laboratory Compaction Characteristics of Soil Using Modified Effort (ASTM D1557) is performed to determine the relationship between the moisture content and density of soils and soil-aggregate mixtures when compacted in a standard size mold with a 10-lbf hammer from a height of 18 inches. The test is performed on a representative bulk sample of bearing soil near the estimated footing depth. The procedure is repeated on the same soil sample at various moisture contents sufficient to establish a relationship between the maximum dry unit weight and the optimum water content for the soil. The data, when plotted, represents a curvilinear relationship known as the moisture density relations curve. The values of optimum water content and modified maximum dry unit weight can be determined from the plotted curve.

Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) are the water contents at certain limiting or critical stages in cohesive soil behavior. The liquid limit (LL or W_L) is the lower limit of viscous flow, the plastic limit (PL or W_P) is the lower limit of the plastic stage of clay and plastic index (PI or I_P) is a range of water content where the soil is plastic. The Atterberg Limits are performed on samples that have been screened to remove any material retained on a No. 40 sieve. The liquid limit is determined by performing trials in which a portion of the sample is spread in a brass cup, divided in two by a grooving tool, and then allowed to flow together from the shocks caused by repeatedly dropping the cup in a standard mechanical device. To determine the Plastic Limit a small portion of plastic soil is alternately pressed together and rolled into a 1/8-inch diameter thread. This process is continued until the water content of the sample is reduced to a point at which the thread crumbles and can no longer be pressed together and re-rolled. The water content of the soil at this point is reported as the plastic limit. The plasticity index is calculated as the difference between the liquid limit and the plastic limit.

One-Dimensional Consolidation Properties of Soils Using Incremental Loading (ASTM D2435) is used to determine the magnitude and rate of consolidation of a soil by applying a series of load increments to an undisturbed soil sample and recording sample deformation at selected time intervals. In this test method, a soil specimen is restrained laterally and drained axially while subjected to incrementally applied controlled-stress loading. Each stress increment is maintained until excess pore water pressures are completely dissipated. During the consolidation process, measurements are made of the change in the specimen height and this data is used to determine the relationship between the effective stress and void-ratio or strain, and the rate at which consolidation can occur by evaluating the coefficient of consolidation. The data from the consolidation test is used to estimate the magnitude and rate of both differential and total settlement of a structure or earth-fill.

Particle Size Analysis of Soils (ASTM D422) is used to determine the particle-size distribution of fine and coarse aggregates. In the test method the sample is separated through a series of sieves of progressively smaller openings for determination of particle size distribution. The total percentage passing each sieve is reported and used to determine the distribution of fine and coarse aggregates in the sample.

R-Value (ASTM D2844) determination was provided by Pavement Engineering, Inc.

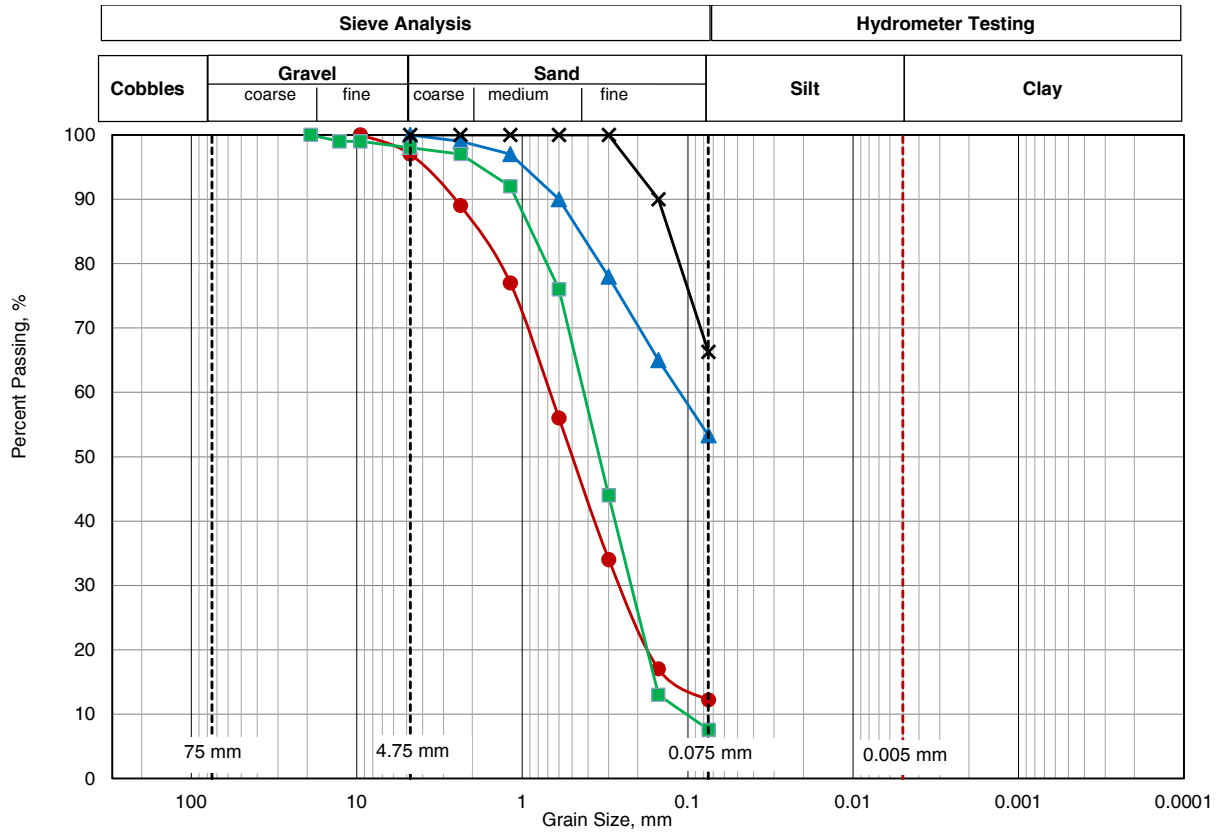
GeoSolutions, Inc. | **LABORATORY SUMMARY REPORT SHEET** | **(805) 543 - 8539**

Project: Battles Elementary School — Lab #: 706
Client: Santa Maria Bonita School District — Date: 4/19/24
Job #: GS00433-1 — Checked By: AE

Sample ID			Material Description	USCS Specifications	Dry Density (pcf)	Moisture Content (%)	% Fines	Atterberg Limits		Compaction Curve		Direct Shear (Peak)		Direct Shear (Ultimate)		Expansion Index	R-Value
Boring Hole	Depth (ft)	Sample						LL	PI	γ_{d_max} (pcf)	ω_{c_opt} (%)	C (psf)	ø (deg)	C (psf)	ø (deg)		
B-1	2-6'	A	Dark Yellowish Brown Silty SAND	SM			12.2			123.3	9.8						
B-1	4'		Dark Yellowish Brown Silty SAND	SM								36	39.0	0	40.0		
B-1	9'		Olive Brown Sandy SILT	ML			53.3										
B-1	19'		Yellowish Brown Poorly Graded SAND with Silt	SP-SM			7.6										
B-1	29'		Light Olive Brown Sandy SILT	ML			66.3										
B-1	34'		Light Yellowish Brown Well Graded SAND with Silt	SW-SM			11.4										
B-1	39'		Light Olive Brown Silty SAND	SM			27.6										
B-1	44'		Light Yellowish Brown Silty SAND with Gravel (Sandstone)	SM			16.8										
B-1	48'		Dark Yellowish Brown Silty SAND with Gravel (Sandstone)	SM			15.4										
B-4	1-4'	B	Dark Yellowish Brown Clayey SAND	SC						131.5	7.5	146	32.3	0	32.0		
B-5	1-4'	C	Dark Yellowish Brown Silty SAND	SM													23
B-2	0.5-5'	D	Dark Yellowish Brown Silty SAND	SM	Corrosivity Evaluation												

GeoSolutions, Inc. | **PARTICLE SIZE ANALYSIS SUMMARY REPORT** | **(805) 543-8539**

Project: Battles Elementary School
Client: Santa Maria Bonita School District — Date: 4/19/2024
Project #: GS00433-1 — Checked By: AE



LEGEND

symbol	location	depth	SAMPLE DESCRIPTION	PLASTICITY (FINER FRACTION) Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Expansion Index (EI)
●	B-1	2-6'	Dark Yellowish Brown Silty SAND	-	-	-	-
▲	B-1	9'	Olive Brown Sandy SILT	-	-	-	-
■	B-1	19'	Yellowish Brown Poorly Graded SAND with Silt	-	-	-	-
×	B-1	29'	Light Olive Brown Sandy SILT	-	-	-	-

LEGEND — **PARTICLE SIZE ANALYSIS SUMMARY**

symbol	location	depth	D_{100}	D_{60}	D_{30}	D_{10}	C_u	C_c	% Gravel	% Sand	% Passing No. 200	% Silt	% Clay
●	B-1	2-6'	9.5	0.710	0.265	NA	NA	NA	3.0	84.8	12.2	NA	NA
▲	B-1	9'	4.8	0.118	NA	NA	NA	NA	0.0	46.7	53.3	NA	NA
■	B-1	19'	19.0	0.450	0.232	0.108	4.2	1.1	2.0	90.4	7.6	NA	NA
×	B-1	29'	0.3	0.068	NA	NA	NA	NA	0.0	33.7	66.3	NA	NA

Remarks: Testing was performed in accordance with ASTM D422 and D4318 (where applicable)

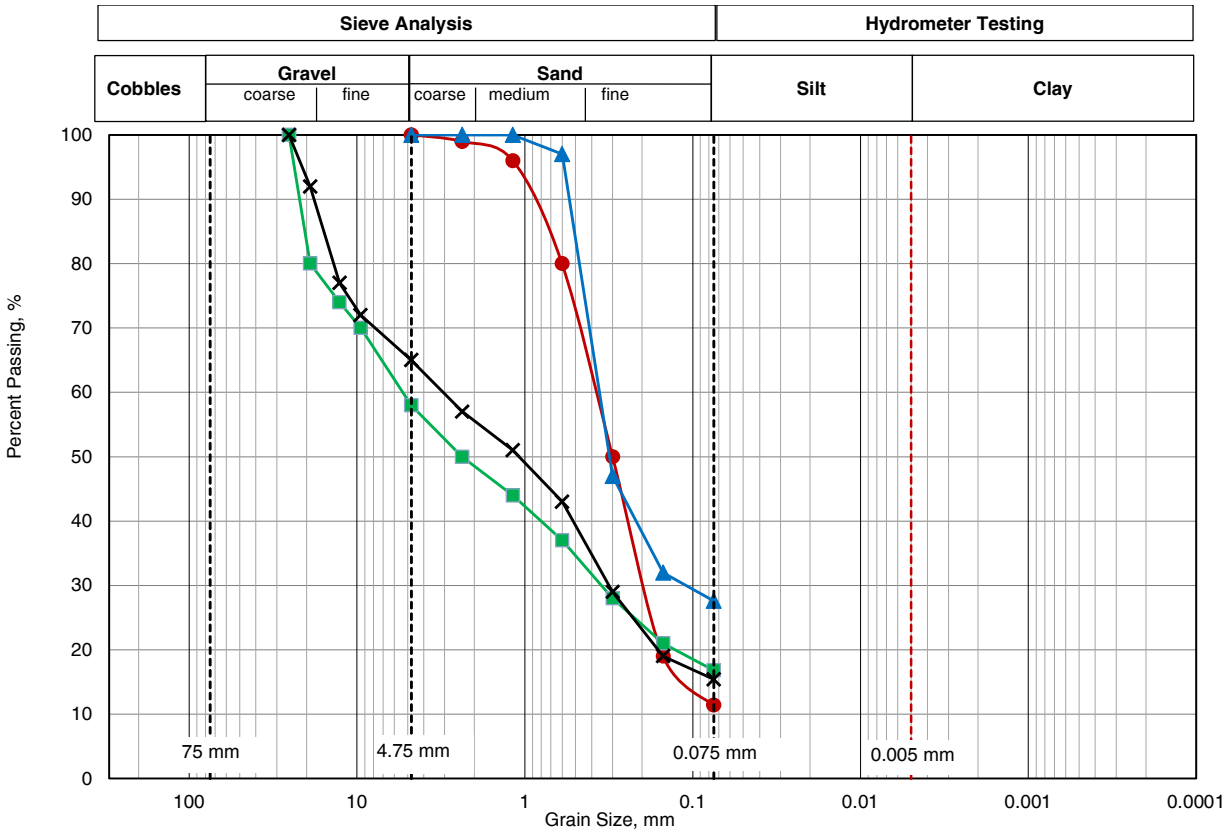
NP - non-plastic
NA - not available (could not be calculated from data)

D_{100} - grain size diameter corresponding to 100% passing (mm)
D_{60} - grain size diameter corresponding to 60% passing (mm)
D_{30} - grain size diameter corresponding to 30% passing (mm)
D_{10} - grain size diameter corresponding to 30% passing (mm)

C_c - coefficient of curvature: $C_c = (D_{30})^2 / (D_{60}*D_{10})$
Cu - coefficient of uniformity: $C_u = D_{60} / D_{10}$

GeoSolutions, Inc. | **PARTICLE SIZE ANALYSIS SUMMARY REPORT** | **(805) 543-8539**

Project: Battles Elementary School
Client: Santa Maria Bonita School District
Project #: GS00433-1
Date: 4/19/2024
Checked By: AE



LEGEND

symbol	location	depth	SAMPLE DESCRIPTION	PLASTICITY (FINER FRACTION) Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Expansion Index (EI)
●	B-1	34'	Light Yellowish Brown Well Graded SAND with Silt	-	-	-	-
▲	B-1	39'	Light Olive Brown Silty SAND	-	-	-	-
■	B-1	44'	Light Yellowish Brown Silty SAND with Sandstone	-	-	-	-
×	B-1	48'	Dark Yellowish Brown Silty SAND with Gravel	-	-	-	-

LEGEND / **PARTICLE SIZE ANALYSIS SUMMARY**

symbol	location	depth	D_{100}	D_{60}	D_{30}	D_{10}	C_u	C_c	% Gravel	% Sand	% Passing No. 200	% Silt	% Clay
●	B-1	34'	4.8	#VALUE!	0.203	NA	NA	NA	0.0	88.6	11.4	NA	NA
▲	B-1	39'	1.2	#VALUE!	0.116	NA	NA	NA	0.0	72.4	27.6	NA	NA
■	B-1	44'	25.4	5.545	0.367	NA	NA	NA	42.0	41.2	16.8	NA	NA
×	B-1	48'	25.4	3.256	0.321	NA	NA	NA	35.0	49.6	15.4	NA	NA

Remarks: Testing was performed in accordance with ASTM D422 and D4318 (where applicable)

NP - non-plastic
NA - not available (could not be calculated from data)

D_{100} - grain size diameter corresponding to 100% passing (mm)
D_{60} - grain size diameter corresponding to 60% passing (mm)
D_{30} - grain size diameter corresponding to 30% passing (mm)
D_{10} - grain size diameter corresponding to 30% passing (mm)

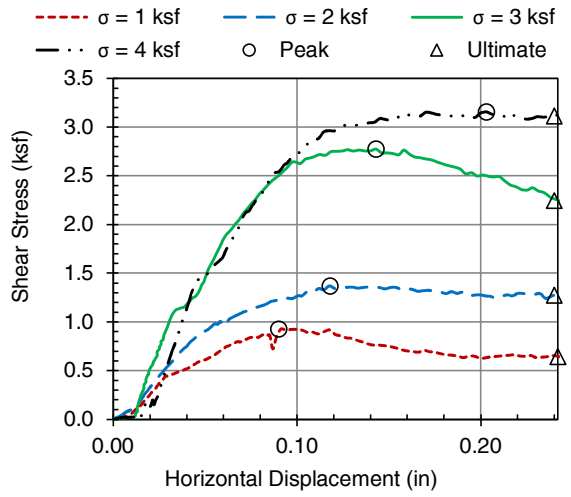
C_c - coefficient of curvature: $C_c = (D_{30})^2 / (D_{60} * D_{10})$
Cu - coefficient of uniformity: $C_u = D_{60} / D_{10}$

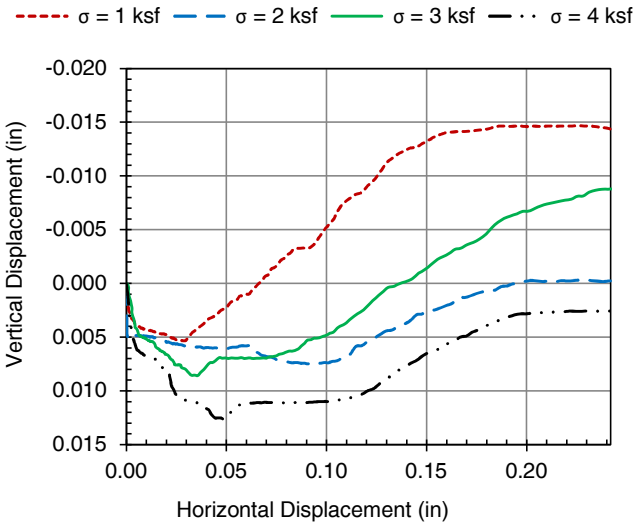
GeoSolutions, Inc. | **DIRECT SHEAR TEST SUMMARY REPORT (ASTM D3080)** | **(805) 543-8539**

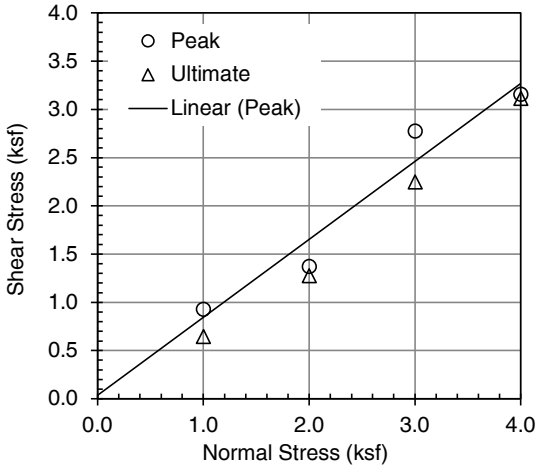
Project:	Battles Elementary School	Project #:	GS00433-1
Client:	Santa Maria Bonita School District	Date Tested:	4/18/2024
Sample:	B-1 @ 4' Depth: 4.0 Feet	Lab #:	706
Location:	B-1	Checked By:	AE

MATERIAL DESCRIPTION	LL	PL	PI	% passing No. 200	Gs *	Sample Type
Dark Yellowish Brown Silty SAND	nm	nm	nm	nm	2.7	in-situ

* Gs = assumed; nm = not measured







Initial Conditions	Specimen No. 1	2	3	4
Dry Density	107.9	103.8	99.6	100.9
Water Content (%)	8.9	8.9	8.9	8.9
Diameter (in)	2.42	2.42	2.42	2.42
Sample Height (in)	1.00	1.00	1.00	1.00

Test Data	Specimen No. 1	2	3	4
Normal Stress (ksf)	1.00	2.00	3.00	4.00
Peak Shear Stress (ksf)	0.928	1.370	2.775	3.155
Horiz. Displacenent at Peak Shear (in)	0.090	0.118	0.143	0.203
Ultimate Shear Stress (ksf)	0.644	1.275	2.246	3.113
Horiz. Displ. at Ult. Shear (in)	0.242	0.240	0.240	0.240
Rate of Deformation (in/min)	0.024	0.024	0.025	0.024

	Peak	Ultimate
Angle of Internal Friction, $ø_{peak}$ (degrees):	**39.0**	**40.0**
Cohesion, C_{peak} (psf)	**36**	**0**

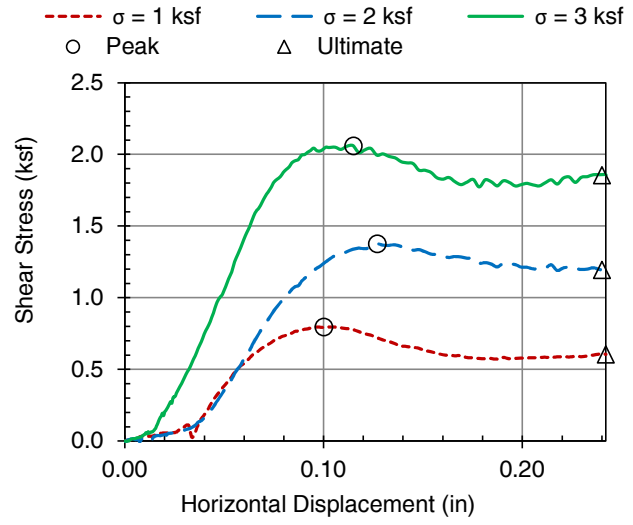
Remarks:

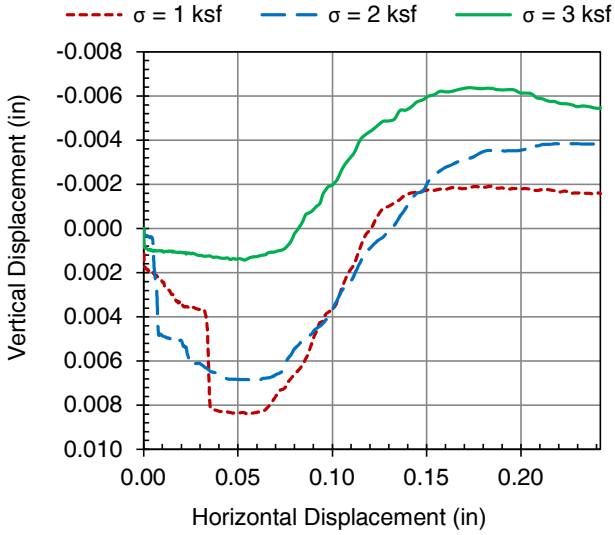
GeoSolutions, Inc. | **DIRECT SHEAR TEST SUMMARY REPORT (ASTM D3080)** | **(805) 543-8539**

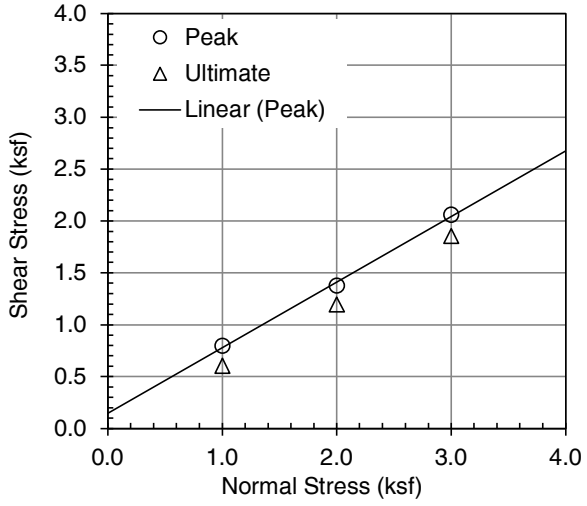
Project:	Battles Elementary School			Project #:	GS00433-1
Client:	Santa Maria Bonita School District			Date Tested:	4/18/2024
Sample:	B	Depth:	1.0 to 4.0 Feet	Lab #:	706
Location:	B-4			Checked By:	AE

MATERIAL DESCRIPTION	LL	PL	PI	% passing No. 200	Gs *	Sample Type
Dark Yellowish Brown Clayey SAND	nm	nm	nm	nm	2.7	remolded

* Gs = assumed; nm = not measured







Initial Conditions	Specimen No. 1	2	3
Dry Density	118.4	118.4	118.4
Water Content (%)	9.5	9.5	9.5
Diameter (in)	2.42	2.42	2.42
Sample Height (in)	1.00	1.00	1.00

Test Data	Specimen No. 1	2	3
Normal Stress (ksf)	1.00	2.00	3.00
Peak Shear Stress (ksf)	0.796	1.376	2.061
Horiz. Displacenent at Peak Shear (in)	0.100	0.127	0.115
Ultimate Shear Stress (ksf)	0.605	1.194	1.855
Horiz. Displ. at Ult. Shear (in)	0.242	0.240	0.240
Rate of Deformation (in/min)	0.024	0.024	0.024

	Peak	Ultimate
Angle of Internal Friction, $ø_{peak}$ (degrees):	**32.3**	**32.0**
Cohesion, C_{peak} (psf)	**146**	**0**

Remarks:

GeoSolutions, Inc.	CONSOLIDATION TEST REPORT (ASTM D2435)	(805) 543-8539

Project:	Battles Elementary School			Date Tested:	5/7/2024
Location:	B-1			Project #:	GS00433-1
Sample:	B-1 @ 4'	Depth:	4.0 Feet	Lab #:	706
Material:	Dark Yellowish Brown Silty SAND			Sampled By:	BJ

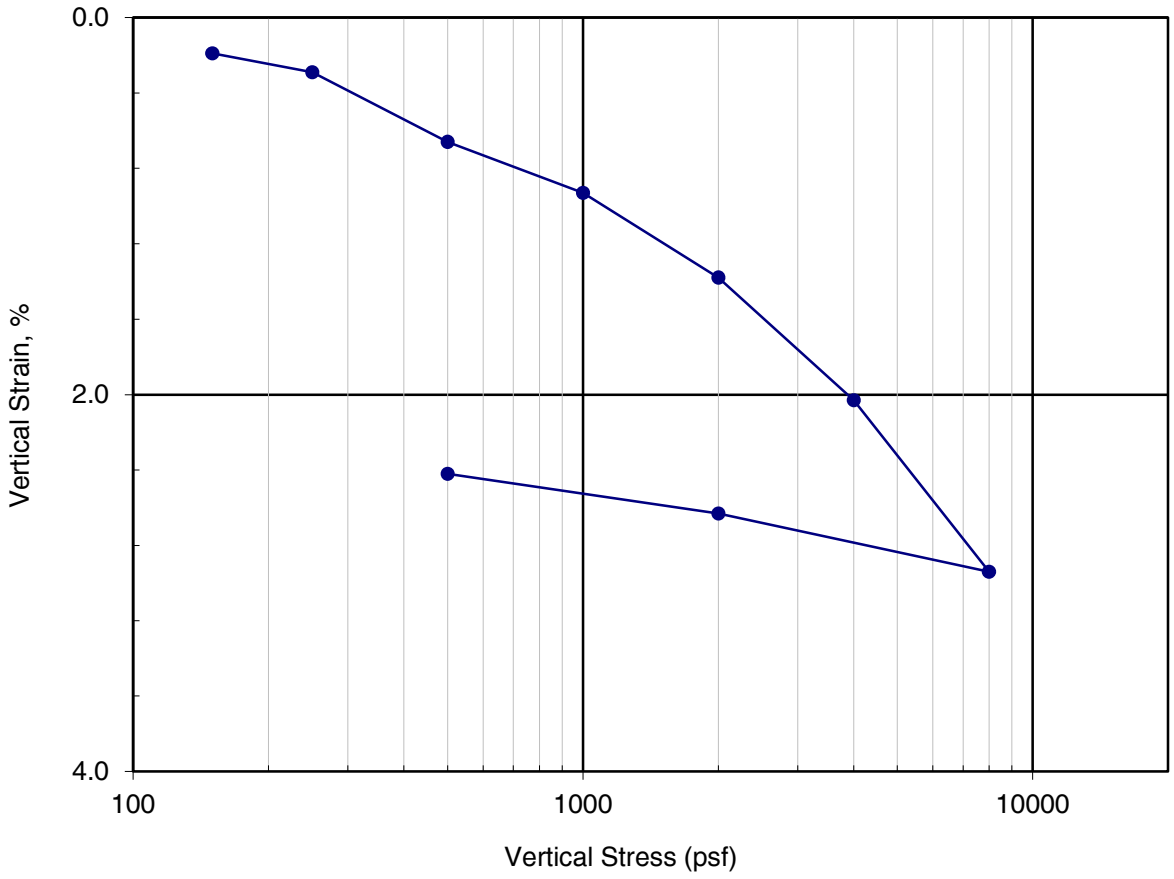
Sample Properties	Initial	Final
Water Content (%)	12.0	20.2
Dry Unit Wt (pcf)	102.1	110.6
Saturation (%)	-	-
Void Ratio, *e*	-	-
Diameter (in)	2.42	2.42
Height (in)	0.87875	0.8125
% Passing #200	-	
Plastic Limit	-	
Liquid Limit	-	
Specific Gravity*, G_s	2.65	
Sample Type	in-situ (ring)	

Test Data	
Preconsolidation stress* (psf)	-
Inundation Loading (psf)	500

Remarks:

Compression Ratio: 0.030
Recomprerssion Ratio: 0.004

*Gs = assumed



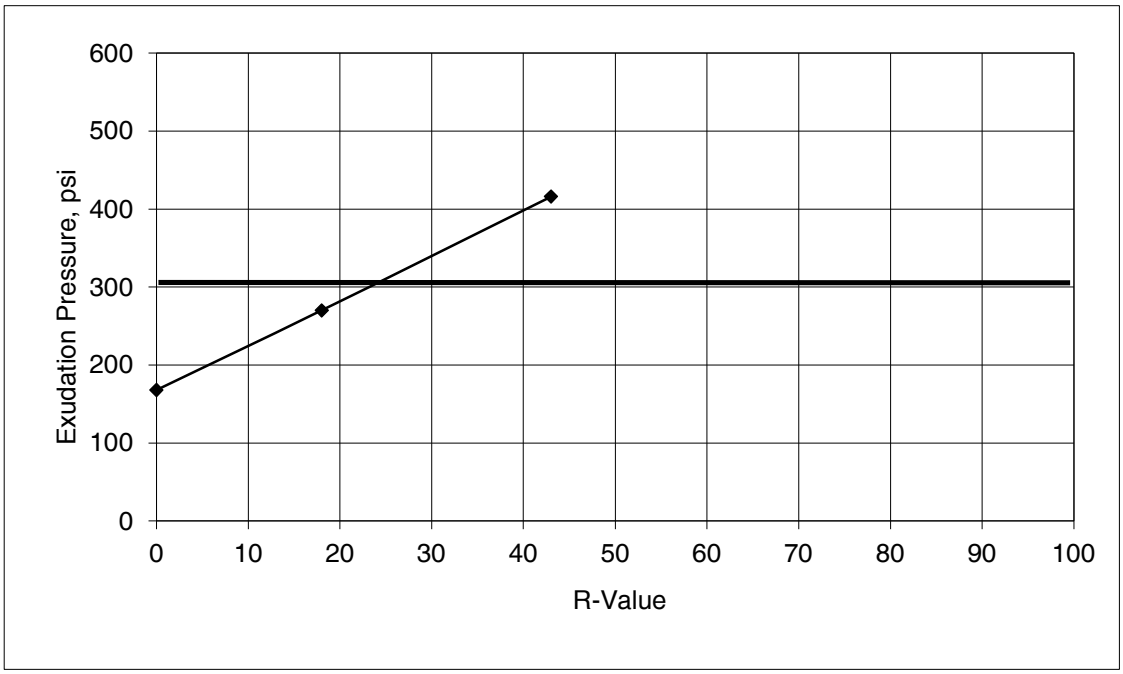
Report By: Aaron Eichman

GeoSolutions, Inc.

R-VALUE TEST REPORT
ASTM D2844

(805) 543-8539

Project:	Battles Elementary School			Date Tested:	May 1, 2024
Client:	Santa Maria Bonita School District			Project #:	GS00433-1
Sample #:	C	Depth:	1.0 to 4.0 Feet	Lab #:	4-Apr
Location:	B-5			Sample Date:	May 1, 2024
Material:	Brown Sandy Silty CLAY			Sampled By:	BJ



Specimen No.	A	B	C
Exudation Pressure, psi	168	270	416
Expansion Pressure, psf	0	22	39
R-Value	0	18	43
Moisture Content at test, %	15.2	14.7	13.7
Dry Density at Test, pcf	120.7	122.2	123.6

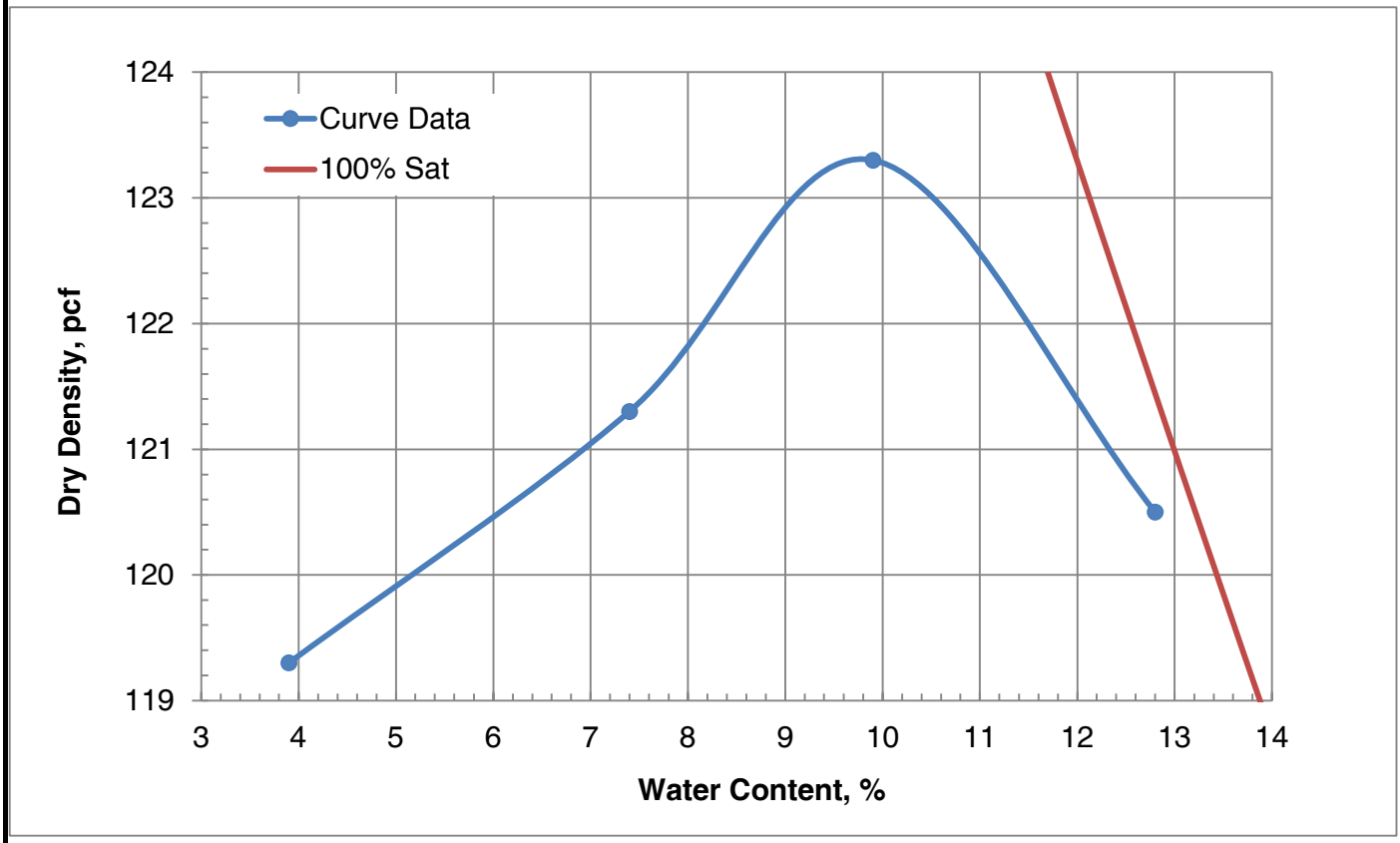
R-Value @ 300 psi Exudation Pressure:	**23**

*R-Values are tested by an outside laboratory, Pavement Engineering.

Report By: Aaron Eichman

GeoSolutions, Inc.	LAB COMPACTION REPORT ASTM D1557	(805) 543-8539

Project:	Battles Elementary School	Date Tested:	April 15, 2024
Client:	Santa Maria Bonita School District	Project #:	GS00433-1
Sample:	A Depth: 2.0 to 6.0 Feet	Lab #:	706
Source:	B-1	Sample Date:	April 19, 2024
Material:	Dark Yellowish Brown Silty SAND	Sampled By:	BJ



ASTM Test Designation: [ ] D 698 [x] D 1557

Method (sieve size): [ ] A (#4) [x] B (3/8") [ ] C (3/4")

% Passing, Pf: _____ *% Retained, Pc:* _____ [x] Estimated [ ] Measured

Type of Rammer: [x] Mechanical [ ] Manual

Preparation Method [x] Moist [ ] Dry

100% Saturation Curve-Estimated Gs: **2.58**

Laboratory Test Results

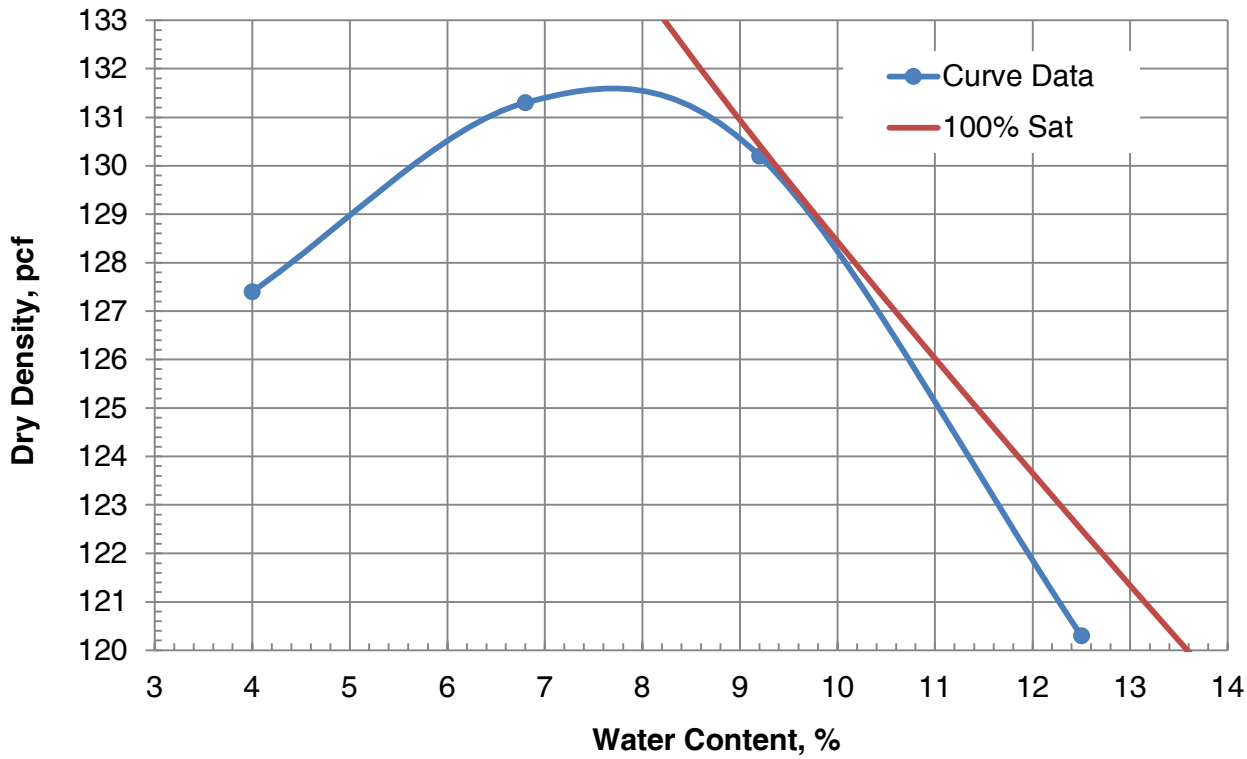
Trial #	1	2	3	4
Water Content,%	3.9	7.4	9.9	12.8
Dry Density, pcf	119.3	121.3	123.3	120.5

MAXIMUM DRY DENSITY, pcf:	123.3	OPTIMUM MOISTURE, %:	9.8

Report By: Aaron Eichman

GeoSolutions, Inc.	LAB COMPACTION REPORT ASTM D1557	(805) 543-8539

Project:	Battles Elementary School	Date Tested:	April 15, 2024
Client:	Santa Maria Bonita School District	Project #:	GS00433-1
Sample:	B Depth: 1.0 to 4.0 Feet	Lab #:	706
Source:	B-4	Sample Date:	April 19, 2024
Material:	Dark Yellowish Brown Clayey SAND	Sampled By:	BJ



ASTM Test Designation: [ ] D 698 [x] D 1557

Method (sieve size): [ ] A (#4) [x] B (3/8") [ ] C (3/4")

% Passing, Pf: _____ *% Retained, Pc:* _____ [x] Estimated [ ] Measured

Type of Rammer: [x] Mechanical [ ] Manual

Preparation Method [x] Moist [ ] Dry

100% Saturation Curve-Estimated Gs: **2.59**

Laboratory Test Results

Trial #	1	2	3	4
Water Content,%	4.0	6.8	9.2	12.5
Dry Density, pcf	127.4	131.3	130.2	120.3

MAXIMUM DRY DENSITY, pcf:	131.5	OPTIMUM MOISTURE, %:	7.5

Report By: Aaron Eichman

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

1 May, 2024

Job No. 2404066
Cust. No. 11360

Mr. Aaron Eichman
GeoSolutions, Inc.
220 High Street
San Luis Obispo, CA 93401

Subject: Project No.: GS00433-1
Project Name: Battles Elementary
Corrosivity Analysis – ASTM Test Methods

Dear Mr. Eichman:

Pursuant to your request, CERCO Analytical has analyzed the soil sample submitted on April 26, 2024. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurement, the sample is classified as "moderately corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentration reflects none detected with a reporting limit of 15 mg/kg.

The sulfate ion concentration is 19 mg/kg and is determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at this location.

The pH of the soil is 8.04, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potential is 250-mV and is indicative of potentially "slightly corrosive" soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

for

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client:	GeoSolutions, Inc.
Client's Project No.:	GS00433-1
Client's Project Name:	Battles Elementary
Date Sampled:	Not Indicated
Date Received:	26-Apr-24
Matrix:	Soil
Authorization:	Signed Chain of Custody

Date of Report: 1-May-2024

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2404066-001	D	250	8.04	-	4,200	-	N.D.	19

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	29-Apr-2024	30-Apr-2024	-	29-Apr-2024	-	30-Apr-2024	30-Apr-2024

* Results Reported on "As Received" Basis

N.D. - None Detected

Julia Clauson
Chemist

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

APPENDIX C

Seismic Hazard Analysis

Design Map Summary (SEAOC, 2019)

SEISMIC HAZARD ANALYSIS

According to section 1613 of the 2022 CBC (CBSC, 2022), all structures and portions of structures should be designed to resist the effects of seismic loadings caused by earthquake ground motions in accordance with the *ASCE 7: Minimum Design Loads for Buildings and Other Structures*, hereafter referred to as ASCE7-16 (ASCE, 2016). Estimating the design ground motions at the Site depends on many factors including the distance from the Site to known active faults; the expected magnitude and rate of recurrence of seismic events produced on such faults; the source-to-site ground motion attenuation characteristics; and the Site soil profile characteristics. As per section 1613.2.2 of the 2022 CBC, the Site soil profile classification is determined by the average soil properties in the upper 100 feet of the Site profile and can be determined based on the criteria provided in Table 20.3-1 of ASCE7-16.

ASCE7-16 provides recommendations for estimating site-specific ground motion parameters for seismic design considering a Risk-targeted Maximum Considered Earthquake (MCE_R) in order to determine *design spectral response accelerations* and a Maximum Considered Earthquake Geometric Mean (MCE_G) in order to determine probabilistic geometric mean *peak ground accelerations*.

Spectral accelerations from the MCE_R are based on a 5% damped acceleration response spectrum and a 1% probability of exceedance in 50 years. *Maximum* short period (S_s) and 1-second period (S_1) spectral accelerations are interpolated from the MCE_R-based ground motion parameter maps for bedrock, provided in ASCE7-16. These spectral accelerations are then multiplied by site-specific coefficients (F_a, F_v), based on the Site soil profile classification and the maximum spectral accelerations determined for bedrock, to yield the *maximum* short period (S_{MS}) and 1-second period (S_{M1}) spectral response accelerations at the Site. According to section 11 of ASCE7-16 and section 1613 of the 2022 CBC, buildings and structures should be specifically proportioned to resist *design* earthquake ground motions. Section 1613.2.4 of the 2022 CBC indicates the site-specific *design* spectral response accelerations for short (S_{DS}) and 1-second (S_{D1}) periods can be taken as two-thirds of *maximum* ($S_{DS} = 2/3*S_{MS}$ and $S_{D1} = 2/3*S_{M1}$).

Per ASCE7-16, Section 21.5, the probabilistic maximum mean peak ground acceleration (PGA) corresponding to the MCE_G can be computed assuming a 2% probability of exceedance in 50 years (2475-year return period) and is initially determined from mapped ground accelerations for bedrock conditions. The site-specific peak ground acceleration (PGA_M) is then determined by multiplying the PGA by the site-specific coefficient F_h (where F_h is a function of Site Class and PGA).

Spectral response accelerations and peak ground accelerations, provided in this report were obtained using the computer-based Seismic Design Maps tool available from the Structural Engineers Association of California (SEAOC, 2019). This program utilizes the methods developed in ASCE 7-16 in conjunction with user-inputted Site location to calculate seismic design parameters and response spectra (both for period and displacement) for soil profile Site Classes A through E.

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout* error.
USGS web services are now operational so this tool should work as expected.

Battles Elementary School - TK/K Buiding

Latitude, Longitude: 34.931925, -120.428691

Date	5/17/2024, 3:14:23 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.963	MCE_R ground motion. (for 0.2 second period)
S_1	0.358	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.074	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	0.716	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.115	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.423	MCE_G peak ground acceleration
F_{PGA}	1.177	Site amplification factor at PGA
PGA_M	0.498	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	0.963	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.069	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.767	Factored deterministic acceleration value. (0.2 second)
S1RT	0.358	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.395	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.662	Factored deterministic acceleration value. (1.0 second)
PGAd	0.738	Factored deterministic acceleration value. (Peak Ground Acceleration)

Type	Value	Description
PGA_{UH}	0.423	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.901	Mapped value of the risk coefficient at short periods
C_{R1}	0.906	Mapped value of the risk coefficient at a period of 1 s
C_V	1.282	Vertical coefficient

DISCLAIMER

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APPENDIX D

Preliminary Grading Specifications

PRELIMINARY GRADING SPECIFICATIONS

A. General

1. These preliminary specifications have been prepared for the subject site; GeoSolutions, Inc. should be consulted prior to the commencement of site work associated with site development to ensure compliance with these specifications.

2. GeoSolutions, Inc. should be notified at least 72 hours prior to site clearing or grading operations on the property in order to observe the stripping of surface materials and to coordinate the work with the grading contractor in the field.

3. These grading specifications may be modified and/or superseded by recommendations contained in the text of this report and/or subsequent reports.

4. If disputes arise out of the interpretation of these grading specifications, the Soils Engineer shall provide the governing interpretation.

B. Obligation of Parties

1. The Soils Engineer should provide observation and testing services and should make evaluations to advise the client on geotechnical matters. The Soils Engineer should report the findings and recommendations to the client or the authorized representative.

2. The client should be chiefly responsible for all aspects of the project. The client or authorized representative has the responsibility of reviewing the findings and recommendations of the Soils Engineer. During grading the client or the authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

3. The contractor is responsible for the safety of the project and satisfactory completion of all grading and other operations on construction projects, including, but not limited to, earthwork in accordance with project plans, specifications, and controlling agency requirements.

C. Site Preparation

1. The client, prior to any site preparation or grading, should arrange and attend a meeting which includes the grading contractor, the design Structural Engineer, the Soils Engineer, representatives of the local building department, as well as any other concerned parties. All parties should be given at least 72 hours' notice.

2. All surface and sub-surface deleterious materials should be removed from the proposed building and pavement areas and disposed of off-site or as approved by the Soils Engineer. This includes, but is not limited to, any debris, organic materials, construction spoils, buried utility line, septic systems, building materials, and any other surface and subsurface structures within the proposed building areas. Trees designated for removal on the construction plans should be removed and their primary root systems grubbed under the observations of a representative of GeoSolutions, Inc. Voids left from site clearing should be cleaned and backfilled as recommended for structural fill.

3. Once the Site has been cleared, the exposed ground surface should be stripped to remove surface vegetation and organic soil. A representative of GeoSolutions, Inc. should determine the required

depth of stripping at the time of work being completed. Strippings may either be disposed of off-site or stockpiled for future use in landscape areas, if approved by the landscape architect.

D. Site Protection

1. Protection of the Site during the period of grading and construction should be the responsibility of the contractor.

2. The contractor should be responsible for the stability of all temporary excavations.

3. During periods of rainfall, plastic sheeting should be kept reasonably accessible to prevent unprotected slopes from becoming saturated. Where necessary during periods of rainfall, the contractor should install check-dams, de-silting basins, sand bags, or other devices or methods necessary to control erosion and provide safe conditions.

E. Excavations

1. Materials that are unsuitable should be excavated under the observation and recommendations of the Soils Engineer. Unsuitable materials include, but may not be limited to: 1) dry, loose, soft, wet, organic, or compressible natural soils; 2) fractured, weathered, or soft bedrock; 3) non-engineered fill; 4) other deleterious materials; and 5) materials identified by the Soils Engineer or Engineering Geologist.

2. Unless otherwise recommended by the Soils Engineer and approved by the local building official, permanent cut slopes should not be steeper than 2:1 (horizontal to vertical). Final slope configurations should conform to section 1804 of the 2022 California Building Code unless specifically modified by the Soil Engineer/Engineering Geologist.

3. The Soil Engineer/Engineer Geologist should review cut slopes during excavations. The contractor should notify the Soils Engineer/Engineer Geologist prior to beginning slope excavations.

F. Structural Fill

8. Structural fill should not contain rocks larger than 4 inches in greatest dimension, and should have no more than 15 percent larger than 3 inches in greatest dimension.

9. Imported fill should be free of organic and other deleterious material and should have very low expansion potential, with a plasticity index of 12 or less. Before delivery to the Site, a sample of the proposed import should be tested in our laboratory to determine its suitability for use as structural fill.

G. Compacted Fill

1. Structural fill using approved import or native should be placed in horizontal layers, each approximately 8 inches in thickness before compaction. On-site inorganic soil or approved imported

fill should be conditioned with water to produce a soil water content near optimum moisture and compacted to a minimum relative compaction of 90 percent based on ASTM D1557.

2. Fill slopes should not be constructed at gradients greater than 2-to-1 (horizontal to vertical). The contractor should notify the Soils Engineer/Engineer Geologist prior to beginning slope excavations.

3. If fill areas are constructed on slopes greater than 10-to-1 (horizontal to vertical), we recommend that benches be cut every 4 feet as fill is placed. Each bench shall be a minimum of 10 feet wide with a minimum of 2 percent gradient into the slope.

4. If fill areas are constructed on slopes greater than 5-to-1, we recommend that the toe of all areas to receive fill be keyed a minimum of 24 inches into underlying dense material. Key depths are to be observed and approved by a representative of GeoSolutions, Inc. Sub-drains shall be placed in the keyway and benches as required.

H. Drainage

1. During grading, a representative of GeoSolutions, Inc. should evaluate the need for a sub-drain or back-drain system. Areas of observed seepage should be provided with sub-surface drains to release the hydrostatic pressures. Sub-surface drainage facilities may include gravel blankets, rock filled trenches or Multi-Flow systems or equal. The drain system should discharge in a non-erosive manner into an approved drainage area.

2. All final grades should be provided with a positive drainage gradient away from foundations. Final grades should provide for rapid removal of surface water runoff. Ponding of water should not be allowed on building pads or adjacent to foundations. Final grading should be the responsibility of the contractor, general Civil Engineer, or architect.

3. Concentrated surface water runoff within or immediately adjacent to the Site should be conveyed in pipes or in lined channels to discharge areas that are relatively level or that are adequately protected against erosion.

4. Water from roof downspouts should be conveyed in solid pipes that discharge in controlled drainage localities. Surface drainage gradients should be planned to prevent ponding and promote drainage of surface water away from building foundations, edges of pavements and sidewalks. For soil areas we recommend that a minimum of 2 percent gradient be maintained.

5. Attention should be paid by the contractor to erosion protection of soil surfaces adjacent to the edges of roads, curbs and sidewalks, and in other areas where hard edges of structures may cause concentrated flow of surface water runoff. Erosion resistant matting such as Miramat, or other similar products, may be considered for lining drainage channels.

6. Sub-drains should be placed in established drainage courses and potential seepage areas. The location of sub-drains should be determined after a review of the grading plan. The sub-drain outlets should extend into suitable facilities or connect to the proposed storm drain system or existing

drainage control facilities. The outlet pipe should consist of a non-perforated pipe the same diameter as the perforated pipe.

I. Maintenance

1. Maintenance of slopes is important to their long-term performance. Precautions that can be taken include planting with appropriate drought-resistant vegetation as recommended by a landscape architect, and not over-irrigating, a primary source of surficial failures.

2. Property owners should be made aware that over-watering of slopes is detrimental to long term stability of slopes.

J. Underground Facilities Construction

1. The attention of contractors, particularly the underground contractors, should be drawn to the State of California Construction Safety Orders for "Excavations, Trenches, Earthwork." Trenches or excavations greater than 5 feet in depth should be shored or sloped back in accordance with OSHA Regulations prior to entry.

2. Bedding is defined as material placed in a trench up to 1 foot above a utility pipe and backfill is all material placed in the trench above the bedding. Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand to be used as bedding should be tested in our laboratory to verify its suitability and to measure its compaction characteristics. Sand bedding should be compacted by mechanical means to achieve at least 90 percent relative compaction based on ASTM D1557.

3. On-site inorganic soils, or approved import, may be used as utility trench backfill. Proper compaction of trench backfill will be necessary under and adjacent to structural fill, building foundations, concrete slabs, and vehicle pavements. In these areas, backfill should be conditioned with water (or allowed to dry), to produce a soil water content near the optimum value and placed in horizontal layers, each not exceeding 8 inches in thickness before compaction. Each layer should be compacted to at least 90 percent relative compaction based on ASTM D1557. The top lift of trench backfill under vehicle pavements should be compacted to the requirements given in report under Preparation of Paved Areas for vehicle pavement sub-grades. Trench walls must be kept moist prior to and during backfill placement.

K. Completion of Work

1. After the completion of work, a report should be prepared by the Soils Engineer retained to provide such services. The report should including locations and elevations of field density tests, summaries of field and laboratory tests, other substantiating data, and comments on any changes made during grading and their effect on the recommendations made in the approved Soils Engineering Report.

2. Soils Engineers shall submit a statement that, to the best of their knowledge, the work within their area of responsibilities is in accordance with the approved soils engineering report and applicable provisions within Chapter 18 of the 2022 CBC.

RFI NO. 1 – RECOMMENDATIONS FOR CONCRETE DRIVE AISLES

DATE
July 23, 2024

PROJECT NUMBER
GS00433-1

CLIENT
Santa Maria-Bonita School District
Attn: Javier Cavazos
321 North Thornburg Street
Santa Maria, CA 93458

PROJECT
New TK/K Building and Site Improvements
Battles Elementary School
605 E Battles Road
Santa Maria, CA

Dear Santa Maria-Bonita School District.:

GeoSolutions, Inc. is pleased to present this RFI No. 1 – Recommendations for Concrete Drive Aisles for the proposed New Transitional Kindergarten and Kindergarten Building and Site Improvements Project to be located at Battles Elementary School, 605 East Battles Road, Santa Maria, California.

GeoSolutions, Inc. prepared the referenced Soils Engineering Report for the project which provided geotechnical recommendations for the proposed improvements. RFI No. 1 provides additional recommendations for concrete drive aisles.

BACKGROUND

On July 1, 2024, GeoSolutions, Inc. was contacted by the Client requesting a recommended structural section for concrete drive aisles to be constructed as part of the project. The referenced Soils Engineering Report (GeoSolutions, Inc. 2024) provided recommendations for flexible pavement sections but did not include recommendations for rigid pavements.

Based on our understanding of the soil conditions at the Site and the anticipated loads imposed by school busses and other large vehicles, we have provided the following design criteria for the proposed concrete drive aisles. These recommendations are intended to provide a structural section consistent with the Seventh Edition of the Caltrans Highway Design Manual and The City of Santa Maria Standard Specifications.

Our findings and recommendations for concrete drive aisles are provided in the following sections of this RFI.

FINDINGS

1. Based on our understanding of the project, it is our understanding that the proposed concrete drive aisles will be located off Battles Road within/adjacent to parking areas.

2. Per the Caltrans Highway Design Manual “it is not practical to engineer rigid bus pads according to the Traffic Index, or according to bus counts.”. Average daily trips by busses and other large vehicles are unknown but are anticipated to be relatively low.

3. The soils encountered during the field exploration of the referenced Soils Engineering Report indicate that the near-surface materials in this area are generally comprised of coarse-grained native alluvial soils (SM, SC), which were observed in medium dense and dry to slightly moist conditions to a minimum depth of approximately 9 feet below ground surface. Based on the Caltrans Highway Design Manual, these materials are categorized as a “Type I” material.

DESIGN RECOMMENDATIONS – CONCRETE DRIVE AISLES

1. For the proposed concrete drive aisles, the following design criteria should be incorporated:

2. All pavement construction and materials used should conform to Sections 26 and 40 of the State of California Department of Transportation Standard Specifications (State of California, 2023).

220 High Street
San Luis Obispo CA 93401
805.543.8539

1021 Tama Lane, Suite 105
Santa Maria, CA 93455
805.614.6333

201 S. Milpas Street, Suite 103
Santa Barbara, CA 93103
805.966.2200

info@geosolutions.net

sbinfo@geosolutions.net

3. The minimum concrete pavement for bus pads should be 0.85 foot of jointed plain concrete with dowel bars at transverse joints. Joints should be constructed at a maximum spacing of 14-feet in each direction.

4. Concrete used in the pavement structure should have a minimum modulus of rupture of 650 pounds per square inch at 42 days.

5. Concrete pavements should be underlain by a minimum of 6 Inches of aggregate base placed at a minimum relative compaction of 95 percent based on the ASTM D1557-12 test method at slightly above optimum moisture content.

PREPARATION OF PAVED AREAS

1. Pavement areas should be excavated to approximate sub-grade elevation or to competent material; whichever is deeper. The exposed surface should be scarified an additional depth of 12 inches, moisture conditioned to slightly above optimum moisture content, and compacted to a minimum relative compaction of 95 percent (ASTM D1557 test method).

2. The top 12 inches of sub-grade soil under all pavement sections should be compacted to a minimum relative compaction of 95 percent based on the ASTM D1557 test method at slightly above optimum.

3. Sub-grade soils should not be allowed to dry out or have excessive construction traffic between moisture conditioning and compaction, and placement of the pavement structural section.

CLOSURE

Thank you for the opportunity to have been of service in preparing this letter. If you have any questions, please contact the undersigned at (805) 543-8539.

Sincerely,
GeoSolutions, Inc.

Kelly Robinson, PhD
Principal Engineer, GE 3118

REFERENCES:

The City of Santa Maria, Standard Specifications for Materials and the Construction of Concrete, Curbs, Gutters, Sidewalks, Driveways, Alleys, Alley Approaches, and Other Concrete Structures in The City of Santa Maria, California. Dated September 2005.

GeoSolutions, Inc. Soils Engineering Report, New TK/K Building and Site Improvements, Battles Elementary School, 605 E Battles Road, Santa Maria, California, Project No. GS00433-1 dated December 26, 2023.

State of California, Department of Transportation. Highway Design Manual – Seventh Edition, Chapter 620 – Rigid Pavement, California Department of Transportation, dated September 29, 2023.

State of California, Department of Transportation. Standard Specifications, California Department of Transportation, 2023.

RFI NO. 2 – RECOMMENDATIONS FOR CAST-IN-PLACE DRILLED PIER FOOTINGS

DATE
July 23, 2024

PROJECT NUMBER
GS00433-1

CLIENT
Santa Maria-Bonita School District
Attn: Javier Cavazos
321 North Thornburg Street
Santa Maria, CA 93458

PROJECT
New TK/K Building and Site Improvements
Battles Elementary School
605 E Battles Road
Santa Maria, CA

Dear Santa Maria-Bonita School District.:

GeoSolutions, Inc. is pleased to present this RFI No. 2 – Recommendations for Cast-In-Place Drilled Pier Footings for the proposed New Transitional Kindergarten and Kindergarten Building and Site Improvements Project to be located at Battles Elementary School, 605 East Battles Road, Santa Maria, California.

GeoSolutions, Inc. prepared the referenced Soils Engineering Report for the project which provided geotechnical recommendations for the proposed improvements. RFI No. 2 provides additional recommendations for cast-in-place drilled pier footings for flagpoles, light poles and monuments.

BACKGROUND

On July 1, 2024, GeoSolutions, Inc. was contacted by the Client requesting recommendations for cast-in-place drilled pier footings for to be used for the design of flagpoles, light poles and monuments to be constructed as part of the project. The referenced Soils Engineering Report (GeoSolutions, Inc. 2024) provided recommendations for conventional building foundations but did not include recommendations for cast-in-place drilled pier footings.

Based on our understanding of the soil conditions at the Site, we have provided the following design criteria for cast-in-place drilled pier footings. These recommendations are intended to provide adequate bearing capacity and resistance to lateral loads for the proposed improvements.

Our findings and recommendations for pier footings are provided in the following sections of this RFI.

FINDINGS

1. Based on our understanding of the project, it is our understanding that the proposed flagpoles, light poles and monuments will utilize foundation systems deriving support from circular piers drilled into native material.

2. Dead and live loads are unknown but are anticipated to be relatively light.

3. The soils encountered during the field exploration of the referenced Soils Engineering Report indicate that the materials in the upper portion of the soil profile at the Site are generally comprised of coarse-grained native alluvial soils (SM, SP-SM, SC), which were observed in medium dense to dense and dry to slightly moist conditions.

DESIGN RECOMMENDATIONS – CAST-IN-PLACE DRILLED PIERS

1. The proposed improvements may be supported by piers drilled into medium dense native materials. For the design of cast-in-place drilled piers, the following design criteria should be incorporated:

2. Pier diameter: Minimum 12 inches.

3. Pier depth: Minimum 4 feet, or 2 feet below the depth of adjacent landscaping materials, whichever is greater.

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4. Exclude lateral resistance and skin friction from the upper 2 feet of the soil profile or to 1 foot below the depth of adjacent landscaping materials, whichever is greater, during pier load capacity calculations. Refer to Figure 1: Caisson Detail.

5. Maximum allowable skin friction: 400 psf. This value may be increased by 1/3 when considering seismic or wind loads. Neglect resistance from pile end-bearing.

6. An equivalent fluid weight of 375 pcf acting on the pier diameter may be used to evaluate passive resistance. The passive pressure may be increased by 1/3 for transient loads such as wind or seismic.

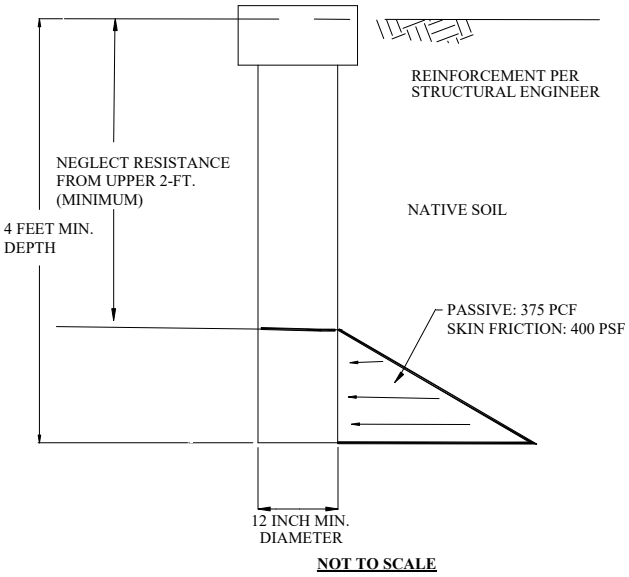

Figure 1: Caisson Detail

7. Minimum pier spacing: 3 pier diameters, center-to-center.

8. Actual pier depths, spacing, and reinforcement should be determined by the engineer, based on structural design considerations.

9. Caisson reinforcing shall be detailed per Section 1810.3.9.4.2 of the 2022 CBC.

10. A 5-foot setback from the face of any slope should be maintained prior to utilizing lateral or frictional design values.

11. Caving and water intrusion are not anticipated to be a concern. If either occurs, the use of temporary casing may be required to facilitate construction. Casing and shaft diameters should be the same diameter. The casing should be progressively placed as drilling advances to design depth. If water intrusion is a problem, the concrete should be placed in the drilled holes prior to retrieving the temporary casing. The bottom of the casing should be maintained not less than 5 feet below the top of the concrete.

12. The Soils Engineer should be present at the Site during the caisson drilling and concrete placement operations to establish conformance with the design concepts, specification requirements, and to provide re-evaluation of these recommendations if site conditions vary from what is anticipated.

CLOSURE

Thank you for the opportunity to have been of service in preparing this letter. If you have any questions, please contact the undersigned at (805) 543-8539.

Sincerely,
GeoSolutions, Inc.

Kelly Robinson, PhD
Principal Engineer, GE 3118

REFERENCES:

GeoSolutions, Inc. Soils Engineering Report, New TK/K Building and Site Improvements, Battles Elementary School, 605 E Battles Road, Santa Maria, California, Project No. GS00433-1 dated December 26, 2023.

GEOLOGIC HAZARD ASSESSMENT

DATE:
August 29, 2024

PROJECT NUMBER:
GS00433-2

CLIENT:
Santa Maria-Bonita School District
Attn: Javier Cavazos
321 North Thornburg Street
Santa Maria, CA 93458

PROJECT NAME:
New TK/K Building and Site Improvements
Battles Elementary School
605 E Battles Road
Santa Maria, CA

1.0 INTRODUCTION

This report presents the results of the geologic hazards assessment for the proposed New Transitional Kindergarten and Kindergarten (TK/K) Building and Site Improvements Project to be located at Battles Elementary School, 605 East Battles Road, Santa Maria, California. See Figure 1: Area Location Map for the general location of the project area.

1.1 Site Description

The proposed new TK/K building is to be located at approximately 34.9319 degrees north latitude and -120.4287 degrees west longitude at a general elevation of 230 feet above mean sea level. The Battles Elementary School is approximately 535 feet (E-W) by 860 feet (N-S) and is bound by East Battles Road to the South and East Enos Drive to the north. Parking improvements and proposed structures are to be located in the southern portion of the property. The area of the proposed new TK/K structure and associated parking improvements will hereafter be referred to as the "Site."

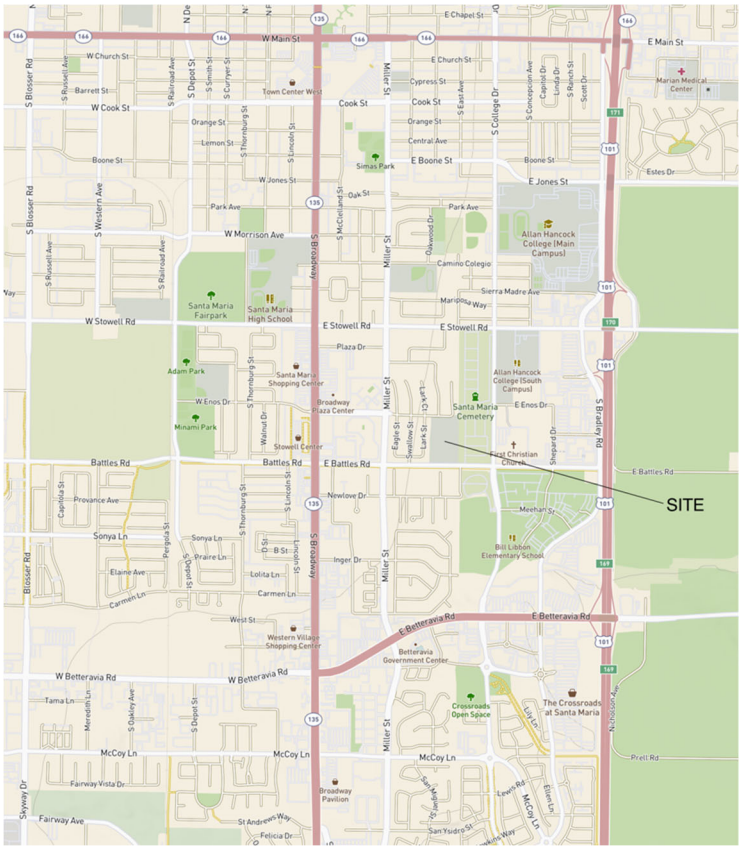

Figure 1: Area Location Map

The Site is currently developed with existing structures, grass, flatwork, sports courts, and parking areas. It is anticipated that the existing structure within the footprint of the proposed TK/K building and other improvements at the Site will be removed as part of this project.

The Site is situated an average elevation of approximately 230 feet (NAVD 88) and slopes very gradually to the west, with approximately 3 feet of elevation difference across the Site. Surface drainage flows to existing drainage facilities along East Battles Road.

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1.2 Project Description

The proposed development is anticipated to consist of constructing a single-story TK/K building with a footprint of approximately 11,860 square feet, as well as associated surface/parking improvements, photovoltaic shade structures, utilities, and landscaping. See Figure 2: Proposed Site Plan for the layout of proposed improvements at the Site. Figure 2: Proposed Site Plan was provided to us by the Client.

It is anticipated that the proposed structure will utilize a slab-on-grade lower floor system. Dead and sustained live loads are currently unknown, but they are anticipated to be relatively light.

A *Geotechnical Investigation Report* dated January 15, 2024, was prepared by BSK Associates and provides geotechnical recommendations for the proposed photovoltaic shade structures (BSK Associates, 2024).

A *Soils Engineering Report* dated June 11, 2024, was prepared by GeoSolutions, Inc. and provides geotechnical recommends for the proposed TK/K building and surface improvements (GeoSolutions, Inc., 2024).

The scope of this report is limited to the proposed TK/K building and surface improvements.

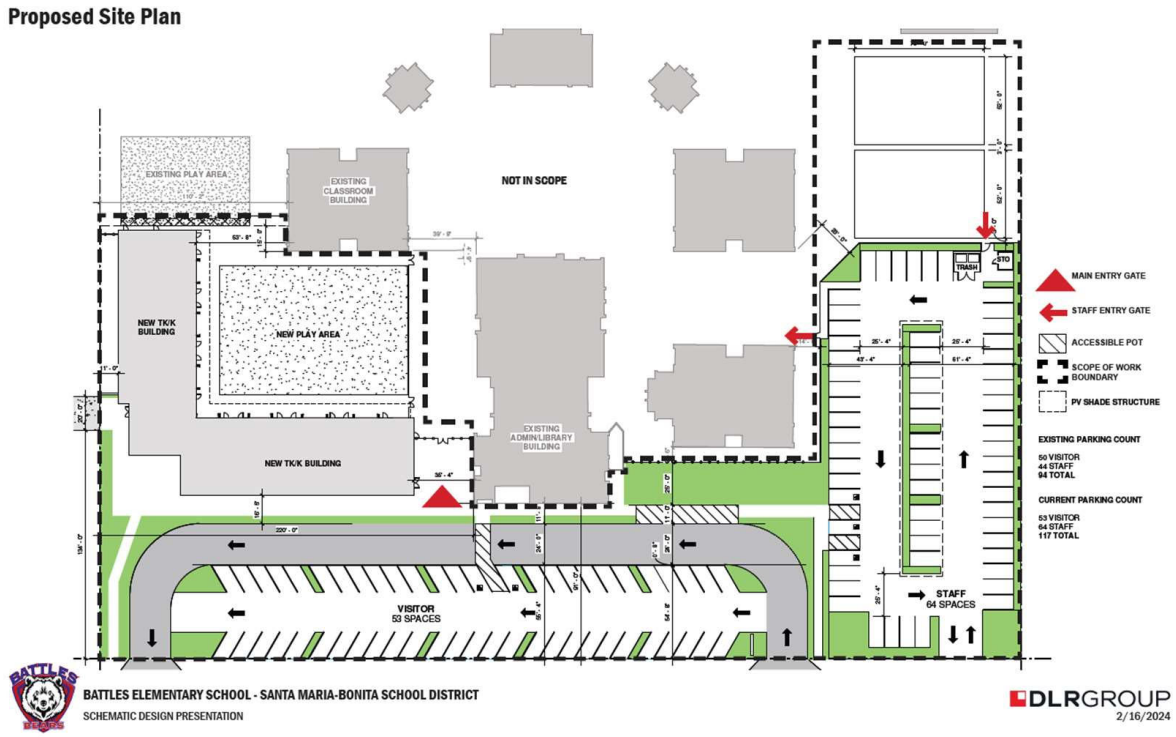


Figure 2: Site Plan (DLR Group, 2024)

2.0 PURPOSE AND SCOPE

The purpose of this investigation was to evaluate engineering geologic hazards at the Site and to develop conclusions and recommendations regarding site development. This report was prepared in accordance with the 2022 California Building Code (CBC), California Geologic Survey Note 48, and the Division of the State Architect (DSA) IR A-4. The scope of this investigation consisted of:

1. Review of historical aerial photographs, pertinent published and unpublished geotechnical studies and literature, and geologic maps for the subject project area.

2. A field study consisting of a site reconnaissance to supplement the previous subsurface explorations included in the above referenced reports in order to formulate a description of the sub-surface conditions at the Site.

3. A review of regional faulting and seismicity hazards.

4. A review of landslide potential, surface and groundwater conditions, and liquefaction hazards.

5. Development of recommendations for site preparation.

6. Preparation of this report that summarizes our findings, conclusions, and recommendations regarding engineering geology aspects of the project.

3.0 GEOLOGIC RECOMMENDATIONS

The proposed development is geologically suitable provided that the recommendations provided herein are implemented. The following are recommended for implementation at the Site.

1. It is anticipated that foundations will be founded within over-excavated engineered fill. The Soils Engineering Report provides additional foundation and construction recommendations.

2. It is recommended that erosion control measures and revegetation of slopes be implemented immediately after the completion of grading.

3. Surface drainage should be controlled to prevent concentrated water-flow discharge onto either natural or constructed slopes. Surface drainage gradients should be planned to prevent ponding and promote drainage of surface water away from building foundations, edges of pavements and sidewalks or natural or man-made slopes. For soil areas we recommend that a minimum of two (2) percent gradient be maintained.

4. Excavation, fill, and construction activities should be in accordance with appropriate codes and ordinances of the City of Santa Maria. In addition, unusual subsurface conditions encountered during grading such as springs or fill material should be brought to the attention of the Engineering Geologist and Soils Engineer.

5. Gutters are recommended to be installed along all sloped rooflines. Gutter downspouts should not allow concentrated drainage to discharge near the building foundations but rather should convey the water in solid piping away from the buildings and toward drainage facilities.

4.0 ENGINEERING GEOLOGY

4.1 Regional Geology

The Site is located in the vicinity of the Santa Maria Valley of the Coast Range Geomorphic Province of California. The Coast Ranges lie between the Pacific Ocean and the Sacramento-San Joaquin Valley and trend northwesterly along the California Coast for approximately 600 miles between Santa Maria and the Oregon border.

The Site lies within a geologic terrain unit known as the Santa Maria Valley block (Lettis and Hall, 1994). The block is characterized by a basement of Cretaceous age (145 to 65 million years before present)

Franciscan Complex rock. The block is bounded by the Wilmar Avenue/Santa Maria River Fault to the northeast and the Casmalia Fault to the southwest.

4.2 Local Geology

Locally, the site is underlain by Alluvial Deposits (Qa) as depicted on Plate 1A and 1B, Site Engineering Geology Map. Worts, 1951, Tennyson, 1992 and Dibblee, 1994 mapped the specific site as underlain by Holocene age Alluvial Deposits (Qal/Qa). Information derived from the previous subsurface explorations in the referenced Soils Engineering Report was used to classify subsurface soil and to supplement geologic mapping.

Six borings were previously drilled to determine the depth and quality of the subsurface material. Boring logs are presented in Appendix A.

4.2.1 Surficial Soil

Alluvial Deposits (Qa)
Alluvial Deposits were mapped throughout the site and encountered within all exploratory borings. Tennyson, 1992 describes the Alluvial Deposits as “Gravel, sand, and mud deposits in stream channels, floodplains, and alluvial fans”. Alluvial Deposits were observed to consist of varying shades of brown silty SAND (SM), silty SAND with gravel (SM), SAND with silt (SP-SM), poorly graded SAND with silt (SP-SM), well graded SAND with silt (SW-SM), sandy SILT (ML), and clayey SAND (SC). These materials were encountered in slightly moist and loose/firm to dense conditions to approximately 42.5 feet bgs in B-1 and to the termination of borings B-2 through B-6 at depths of 15 feet bgs. Boring logs are presented in Appendix A. A cross section on Plate 1C presents subsurface interpretations of the Site. It is anticipated that the footings will be founded into over-excavated engineered fill derived from Alluvial Deposit units.

4.2.2 Formational Units

Orcutt Formation (Qo)
Dibblee, 1994 maps the Orcutt Formation underlying Alluvial Deposits. Dibblee, 1994 describes the Orcutt Formation as “tan to rusty brown wind-deposited sand, and alluvial gravel north of Santa Maria River.” The Orcutt Formation was encountered at a depth of 42.5 feet below existing grade within boring B-1. The Orcutt Formation at the site consists of light yellowish-brown SAND (SP) encountered in a dry and very dense condition. The thickness of Orcutt Formation at the Site is unknown, but Dibblee, 1994 suggest the unit is approximately 250 feet thick.

4.3 Surface and Ground Water Conditions

Groundwater was not encountered in any of the exploratory borings. Review of historic groundwater data available from Geotracker (State Water Resources Control Board, 2024) indicate groundwater levels of approximately 121-130 feet bgs at the Santa Maria Associates LUST cleanup site which is located approximately 0.4 miles west/northwest of Battles Elementary School. It should be anticipated that groundwater levels may change seasonally and with irrigation practices.

4.4 Active Faulting and Coseismic Deformation

Many faults are mapped of varying types, lengths, and age. An active fault is one that shows evidence of displacement within the last 11,000 years (Recent epoch). A fault which displaces deposits of late Pleistocene age (500,000 to 11,000 years) but with no evidence of Recent movement is termed potentially active. Inactive fault is one that displace rocks of early Pleistocene or older (500,000 years or older).

Similar to the general area, the Site can be affected by moderate to major earthquakes centered on one of the known large, Holocene active faults listed in Table No. 1. Moment magnitudes are expressed,

although any event on these faults could result in moderate to severe ground shaking at the subject property.

Table 1: Distance and Moment Magnitude of Closest Faults

Closest Active Faults to Site	Approximate Distance (miles)	Moment Magnitude (Mw)
Los Alamos Fault	17.5	6.9
Hosgri Fault Zone	28.0	6.5
San Andreas	41.0	7.5

The closest known active portion of a Holocene age fault is an active portion of the Los Alamos fault that is located approximately 17.5 miles southwest of the Site (Jennings, 2010). Plate 3 is a Regional Fault Map for the area. The San Andreas fault is the most likely active fault to produce ground shaking at the Site although it is not expected to generate the highest ground accelerations because of its distance from the Site. Figure 7 depicts significant historical earthquakes in the region.

4.4.1 Santa Maria Fault

The Santa Maria fault trends 7 miles north-northeast beneath the City of Santa Maria (Worts, 1951). The fault is depicted as displacement of 150 feet of late Pliocene to early Pleistocene water bearing sediments. However, recent river deposits beneath the Santa Maria Valley are not displaced (Worts, 1951). Approximately 400 feet of displacement was observed on lower Pliocene sediments based on oil wells along the Santa Maria fault (Canfield, 1939). The Santa Maria Fault is considered Quaternary active (Jennings, 2010). Worts, 1951 depicts the Santa Maria Fault approximately 0.5-mile northwest of the site.

4.5 Historical Earthquakes

A search of historical earthquakes was performed in the vicinity of the site (USGS). The search was limited to earthquakes greater than or equal to 5.0 magnitude within a 100-mile radius. The largest earthquakes in the area consist of the 1925 Santa Barbara earthquake (M6.8), 1927 Lompoc earthquake (M6.9), 1952 Kern County earthquake (7.5), 1971 San Fernando earthquake (M6.6) and the 1994 Northridge earthquake (M6.7). Figure 3 depicts significant historical earthquakes in the region.

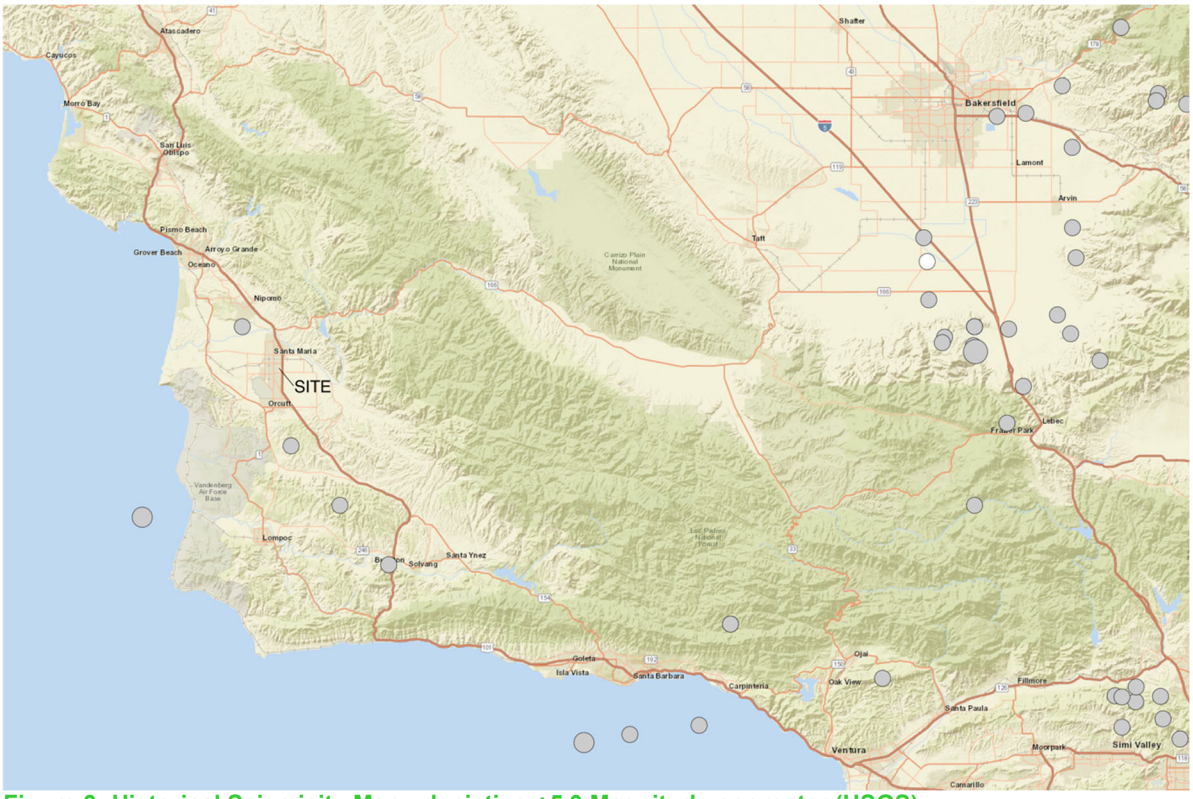


Figure 3: Historical Seismicity Map - depicting +5.0 Magnitude or greater (USGS)

4.6 Landslides

The Santa Maria Safety Element maps the property within a low potential landslide hazard zone. Worts, 1951, Tennyson, 1992 and Dibblee, 1994 do not map landslides in the vicinity of the property. Landslides were not observed in current or historical aerial photographs (1939, 1952, 1964, 1974, current) or during surface mapping. Based on low topographic relief at the Site, there appears to be a low potential for landslides to affect the proposed development. Figure 4 depicts a historical aerial photograph (1974) of the site and the vicinity. Plate 4 depicts a current aerial photograph in the vicinity of the Site (2024).

Figure 4: Historical Aerial Photograph (1974)

4.7 Flooding and Severe Erosion

The site is not located within or near the 100-year or 500-year flood zone based on Federal Emergency Management Agency flood zone maps (FEMA, 2005).

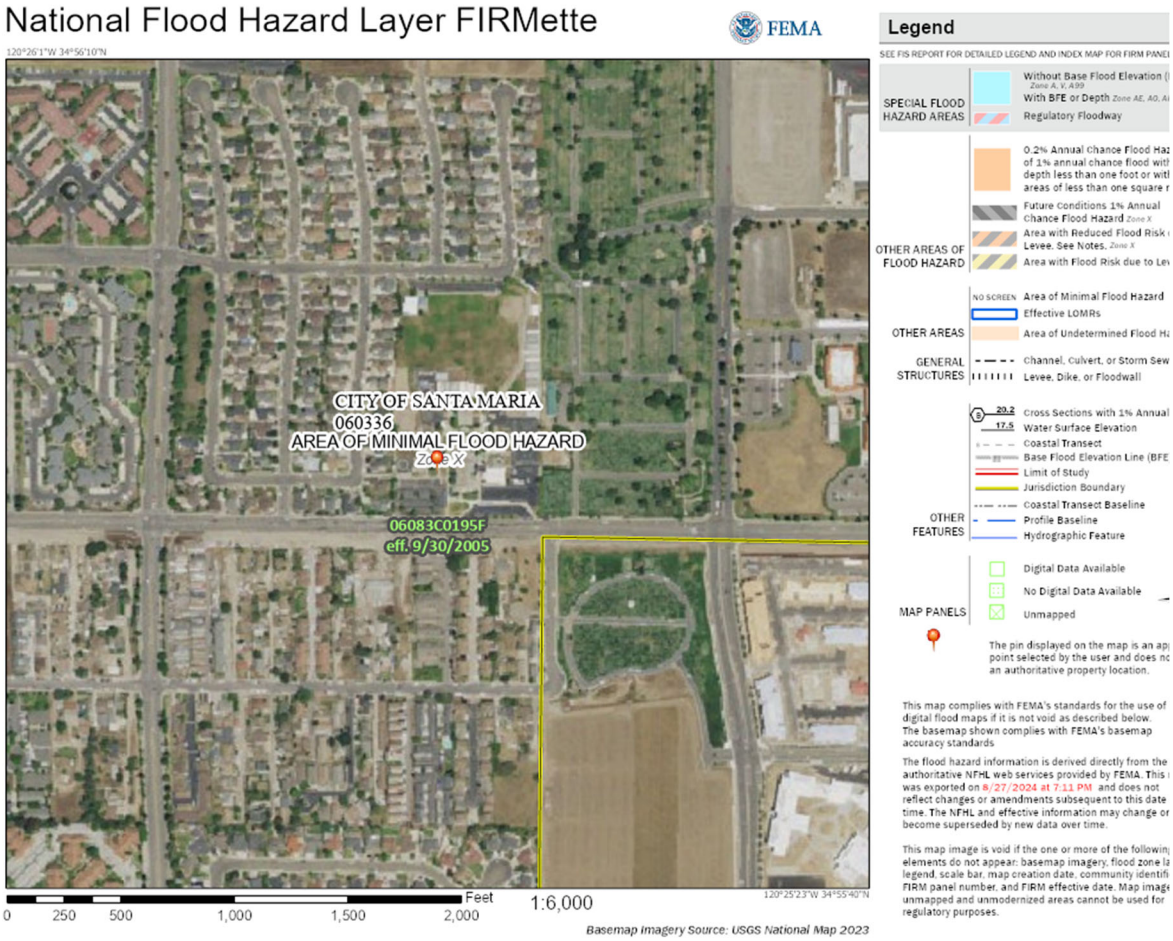


Figure 5: Flood Hazard Map (FEMA, 2005)

The surficial deposits are subject to erosion where not covered with vegetation or hardscape. The potential for severe erosion is low considered provided that vegetation and erosion control measures are implemented immediately after the completion of grading.

5.0 SISMOLOGY AND CALCULATION OF EARTHQUAKE GROUND MOTION

5.1 Seismic Hazard Analysis and Structural Building Design Parameters

Estimating the design ground motions at the Site depends on many factors including the distance from the Site to known active faults; the expected magnitude and rate of recurrence of seismic events produced on such faults; the source-to-site ground motion attenuation characteristics; and the Site soil profile characteristics. According to section 1613 of the 2022 CBC (CBSC, 2022), all structures and portions of structures should be designed to resist the effects of seismic loadings caused by earthquake ground motions in accordance with the ASCE 7: Minimum Design Loads for Buildings and Other Structures, hereafter referred to as ASCE 7-16 (ASCE, 2016). The Site soil profile classification (Site Class) can be determined by the average soil properties in the upper 100 feet of the Site profile and the criteria provided in Table 20.3-1 of ASCE 7-16.

Spectral response accelerations and peak ground accelerations, provided in this report were obtained using the computer-based Seismic Design Maps tool available from the Structural Engineers Association of California (SEAOC, 2024). This program utilizes the methods developed in ASCE 7-16 in conjunction with user-inputted Site location to calculate seismic design parameters and response

spectra (both for period and displacement) for soil profile Site Classes A through E.

Site coordinates of 34.9319 degrees north latitude and -120.4287 degrees west longitude were used in the web-based probabilistic seismic hazard analysis (SEAOC, 2024). Based on the results from the in-situ tests performed during the field exploration, the Site was defined as **Site Class D**, "Stiff Soil" profile per ASCE 7-16, Chapter 20. Relevant seismic design parameters obtained from the program are summarized in Table 2.

Table 2: Seismic Design Parameters

Site Class	D – Stiff Soil
Seismic Risk Category	III
1-Second Period Design Spectral Response Acceleration, S_{D1}	*
Short-Period Design Spectral Response Acceleration, S_{DS}	0.716 g
Site Specific MCE Peak Ground Acceleration, PGA_M	0.498 g

** In accordance with ASCE 7-16, SUPPLEMENT 3, Section 11.4.8.1: A ground motion hazard analysis is not required for structures on Site Class D sites with S_1 greater than or equal to 0.2, where the value of the parameter S_{M1} determined by Eq. (11.4-2) is increased by 50% for all applications of S_{M1} in this Standard. The resulting value of the parameter S_{D1} determined by Eq. (11.4-4) shall be used for all applications of S_{D1} in this Standard.*

6.0 SEISMICALLY-INDUCED SETTLEMENT

The principal effects of an earthquake on consolidated sediments at the Site are seismically induced slope failures and ground failure due to a loss of soil support. Ground failure includes liquefaction, seismically induced settlement, and differential settlement. Assuming proper-engineered densification of Site soils, the potential for seismically induced settlement and differential settlement is considered to be low. The liquefaction potential is discussed below.

7.0 LIQUEFACTION

Liquefaction occurs when saturated cohesionless soils lose shear strength due to earthquake shaking. Ground motion from an earthquake may induce cyclic reversals of shear stresses of large amplitude. Lateral and vertical movement of the soil mass combined with the loss of bearing strength can result from this phenomenon. Liquefaction potential of soil deposits during earthquake activity depends on soil type, void ratio, groundwater conditions, the duration of shaking, and confining pressures on the potentially liquefiable soil unit. Fine, poorly graded loose sand, shallow groundwater, high intensity earthquakes, and long duration of ground shaking are the principal factors leading to liquefaction.

Due to the absence of groundwater during the field exploration and nearby historical groundwater depths in excess of 120 feet, the potential for seismic liquefaction of soils at the Site is considered to be low.

8.0 TSUNAMIS AND SEICHES

Tsunamis and seiches are two types of water waves that are generated by earthquake events. Tsunamis are broad-wavelength ocean waves and seiches are standing waves within confined bodies of water, typically reservoirs. The Tsunami Inundation Map for Emergency Planning (State of California, 2021) depicts the Site outside the tsunami inundation zone. As the property is at an elevation over 230 feet and distance to the Pacific Ocean, the potential for a tsunami to affect the Site is low.

Flooding associated with a seismic event (seiche) is considered low due to the absence of a body of water upslope of the property.

9.0 HAZARDS FROM GEOLOGIC MATERIALS

8.1 Expansive Soils

The potential for expansive soil at the Site is low based the low fines content within the surface material from the referenced Soils Engineering Report. The referenced Soils Engineering Report provides additional foundation and construction recommendations.

8.2 Naturally Occurring Asbestos

There is a low potential for natural occurring asbestos to be present at the property due to the absence of Franciscan Complex units. Naturally occurring asbestos is associated with serpentinite rock units within the Franciscan Complex. Serpentinite was not observed within the borings. Alluvial Deposits at the site were not observed to be derived from Franciscan Complex units.

8.3 Corrosivity

Based on results of resistivity testing from the referenced Soils Engineering Report, material tested from the Site is classified as “moderately corrosive**”.** All buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel or iron should be properly protected against corrosion depending on the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion. The referenced Soils Engineering Report provides additional construction recommendations

8.3 Radon

The Monterey Formation shale is a radon prone geologic unit located at the property. Radon gas is a naturally occurring radioactive gas that is invisible and odorless. It forms from the radioactive decay of small amounts of uranium and thorium naturally present in rocks and soils. Radon gas moves readily through rock and soil along micro-fractures and through pre-spaces between mineral grains. Many conditions affect how far radon can move in the subsurface but the ultimate limitation is the relatively short half-lives of radon’s different isotopes (Churchill, 1997).

Based on mapping (see Figure 6) and the absence of shallow Monterey Formation shale (or other radon producing shale formations), the potential for radon at the Site is low.

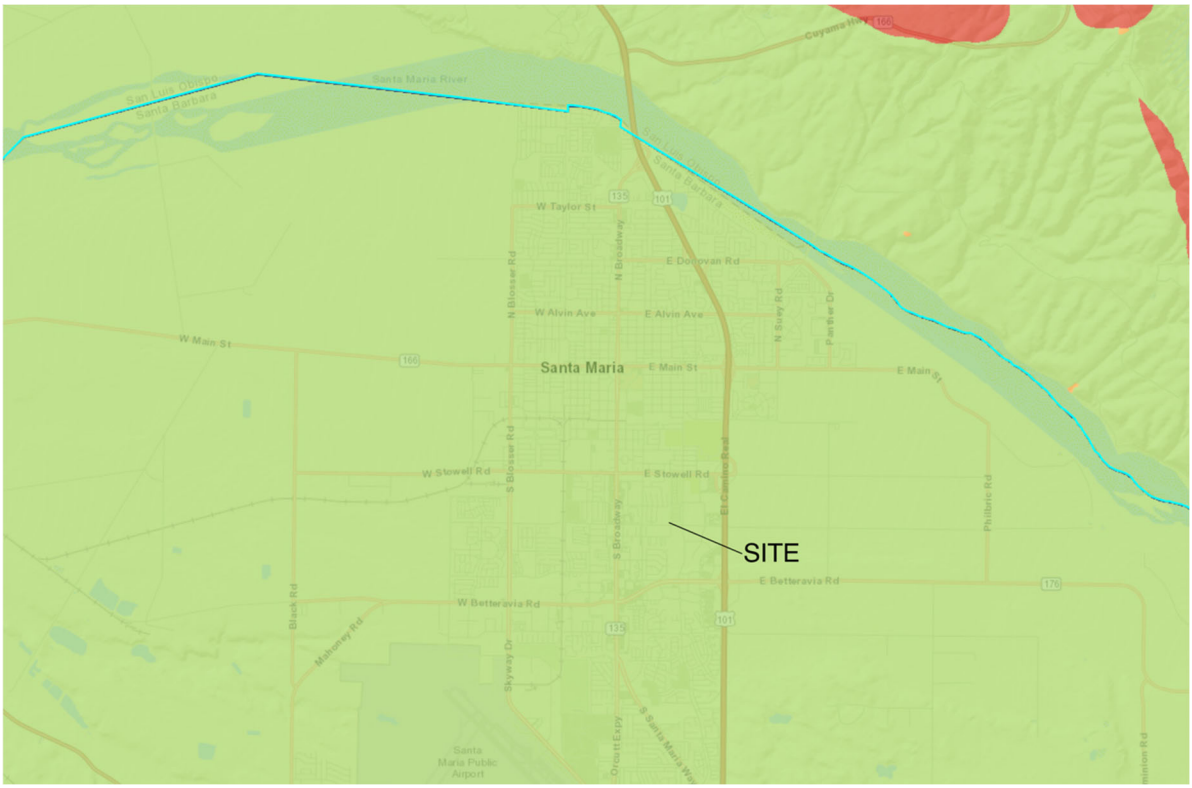


Figure 6: Radon Hazard Map (CGS, 2016)

10.0 GRADING OPERATIONS, CUT AND FULL, SUBDRAINS

It is anticipated that foundations will be founded within over excavated engineered fill. Conventional grading equipment may be used for excavations. The Soils Engineering Report provides additional foundation and construction recommendations. Based on the field investigation, subdrains are not anticipated at this time, however this may be reevaluated at the time of construction.

Construction inspections and testing during all grading and excavating operations should be performed by the project Soils Engineer/Engineering Geologist. Section 1705.6 of the 2022 CBC (CBSC, 2022) requires the following inspections by the Soils Engineer/Engineering Geologist as shown in Table 3: Required Verification and Inspections of Soils:

Table 3: Required Verification and Inspections of Soils

Verification and Inspection Task	Continuous During Task Listed	Periodically During Task Listed
1. Verify materials below footings are adequate to achieve the design bearing capacity.	-	X
2. Verify excavations are extended to proper depth and have reached proper material.	-	X
3. Perform classification and testing of controlled fill materials.	-	X
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.	X	-
5. Prior to placement of controlled fill, observe sub-grade and verify that site has been prepared properly.	-	X

11.0 ADDITIONAL SERVICES

The recommendations contained in this report are based on previous exploratory borings and on the continuity of the sub-surface conditions encountered. It is assumed that GeoSolutions, Inc. will be retained to perform the following services:

1. Consultation during plan development.

2. A preliminary plan review regarding the locations of proposed improvements and development once grading and drainage plans are available.

3. Final plan review of final grading and drainage documents prior to construction.

4. Additionally, construction observation by the Engineering Geologist and/or Soils Engineer may be necessary to verify sub-surface conditions during excavation activities.

5. Final grading report and as-built map in accordance with County Guidelines for Engineering Geology Reports, Item 29 (San Luis Obispo County Department of Planning and Building, 2019).

12.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

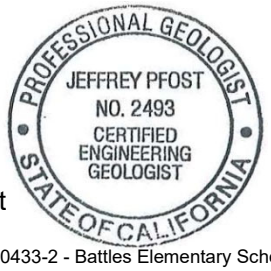
The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed during our study. Should any variations or undesirable conditions be encountered during the development of the Site, GeoSolutions, Inc. should be notified immediately and GeoSolutions, Inc. will provide supplemental recommendations as dictated by the field conditions.

This report is issued with the understanding that it is the responsibility of the owner or his/her representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project, and incorporated into the project plans and specifications. The owner or his/her representative is responsible to ensure that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

As of the present date, the findings of this report are valid for the property studied. With the passage of time, changes in the conditions of a property can occur whether they are due to natural processes or to the works of man on this or adjacent properties. Therefore, this report should not be relied upon after a period of 3 years without our review nor should it be used or is it applicable for any properties other than those studied. However, many events such as floods, earthquakes, grading of the adjacent properties and building and municipal code changes could render sections of this report invalid in less than 3 years.

Thank you for the opportunity to have been of service in preparing this report. If you have any questions or require additional assistance, please feel free to contact the undersigned at (805) 543-8539.

Sincerely,
GeoSolutions, Inc.



Jeffrey Pfost, CEG 2493
Principal Engineering Geologist

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PLATES

Plate 1A, 1B, 1C - Site Engineering Geologic Maps and Site Cross Section

Plate 2A, 2B – Regional Geologic Map, Dibblee, 1994 and Explanations

Plate 3 – Regional Fault Map, Jennings, 2010

Plate 4 – Aerial Photograph, 2024

Scale
1" = 40'

Legend
Qa - Alluvial Deposits (Holocene age)

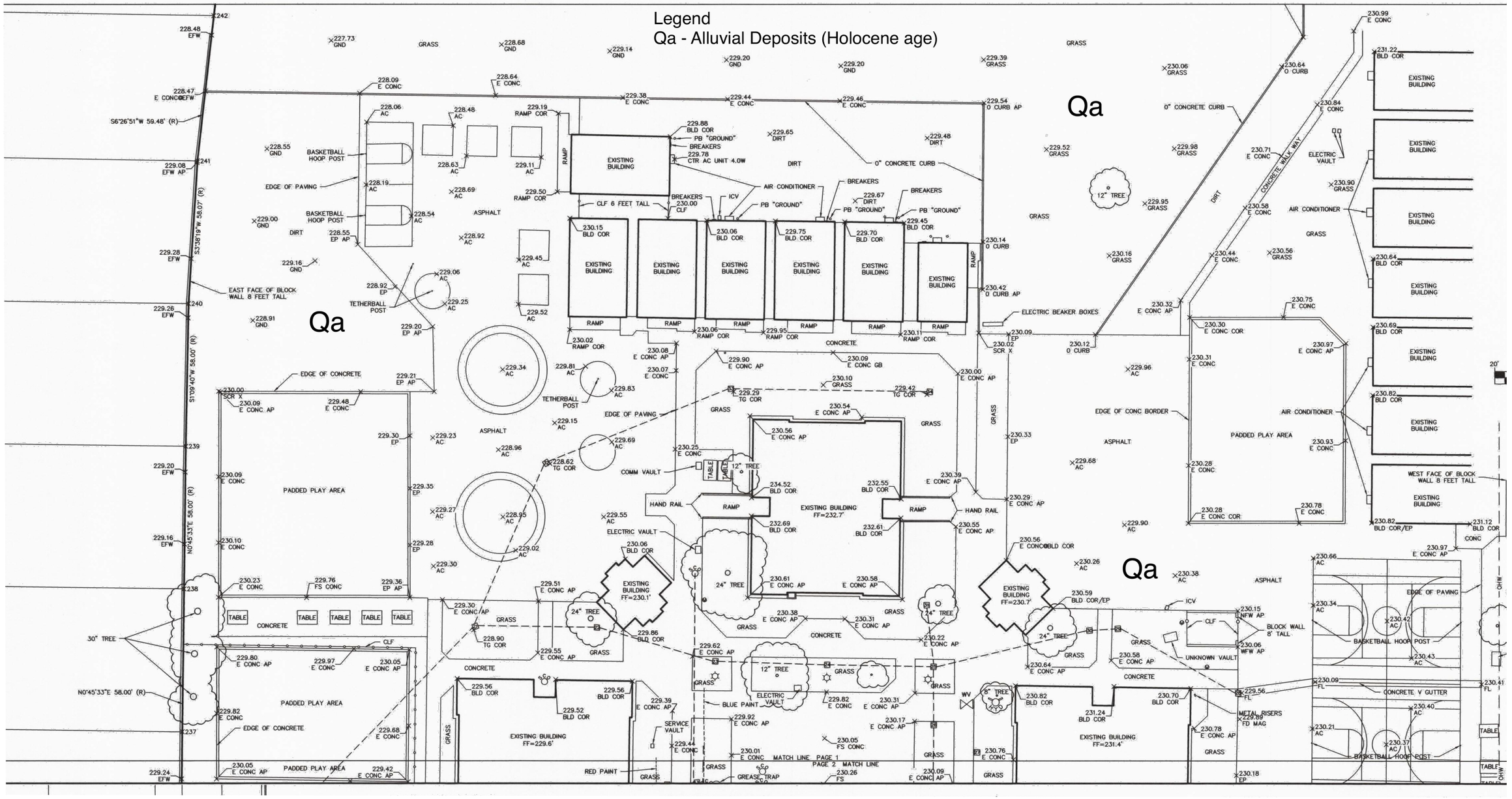

PLATE 1A

PROJECT GS00433-2

SITE ENGINEERING GEOLOGY MAP

BATTLES ELEMENTARY SCHOOL, 605 E. BATTLES ROAD
SANTA MARIA, CALIFORNIA

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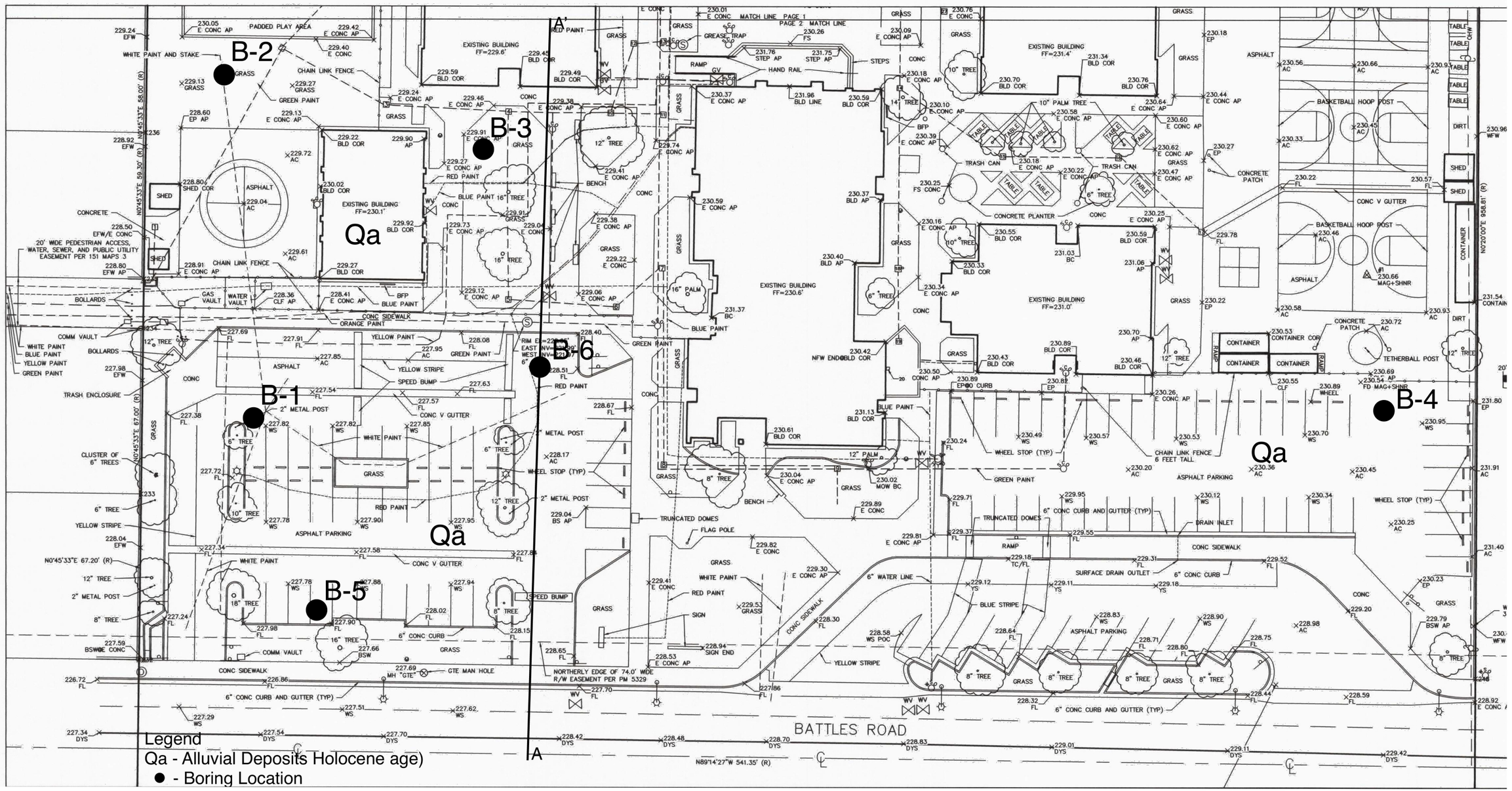

Legend

Qa - Alluvial Deposits Holocene age)

● - Boring Location

Scale

1" = 40'

PLATE 1B

PROJECT GS00433-2

SITE ENGINEERING GEOLOGY MAP

BATTLES ELEMENTARY SCHOOL, 605 E. BATTLES ROAD

SANTA MARIA, CALIFORNIA

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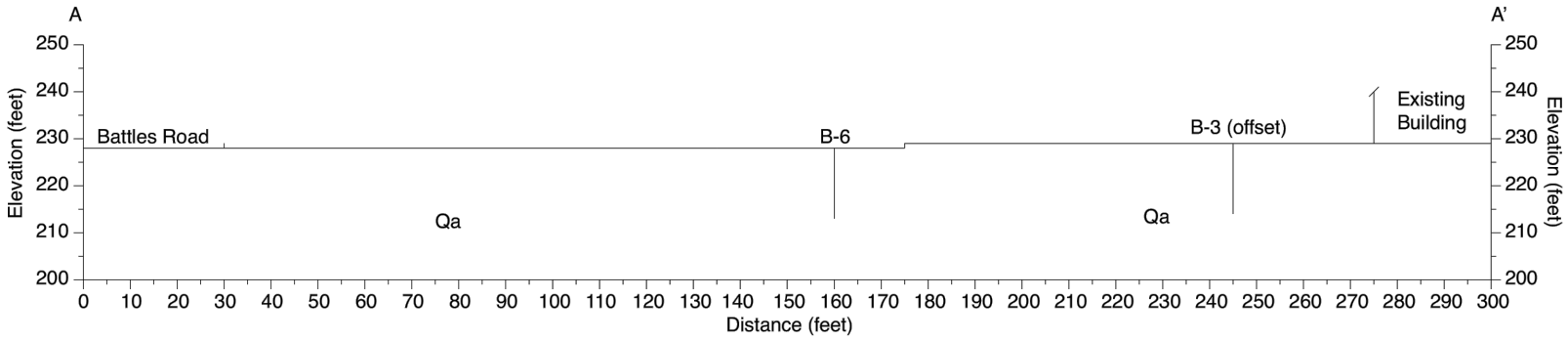

Legend
Qa - Alluvial Deposits (Holocene age)

Scale
1" = 40'

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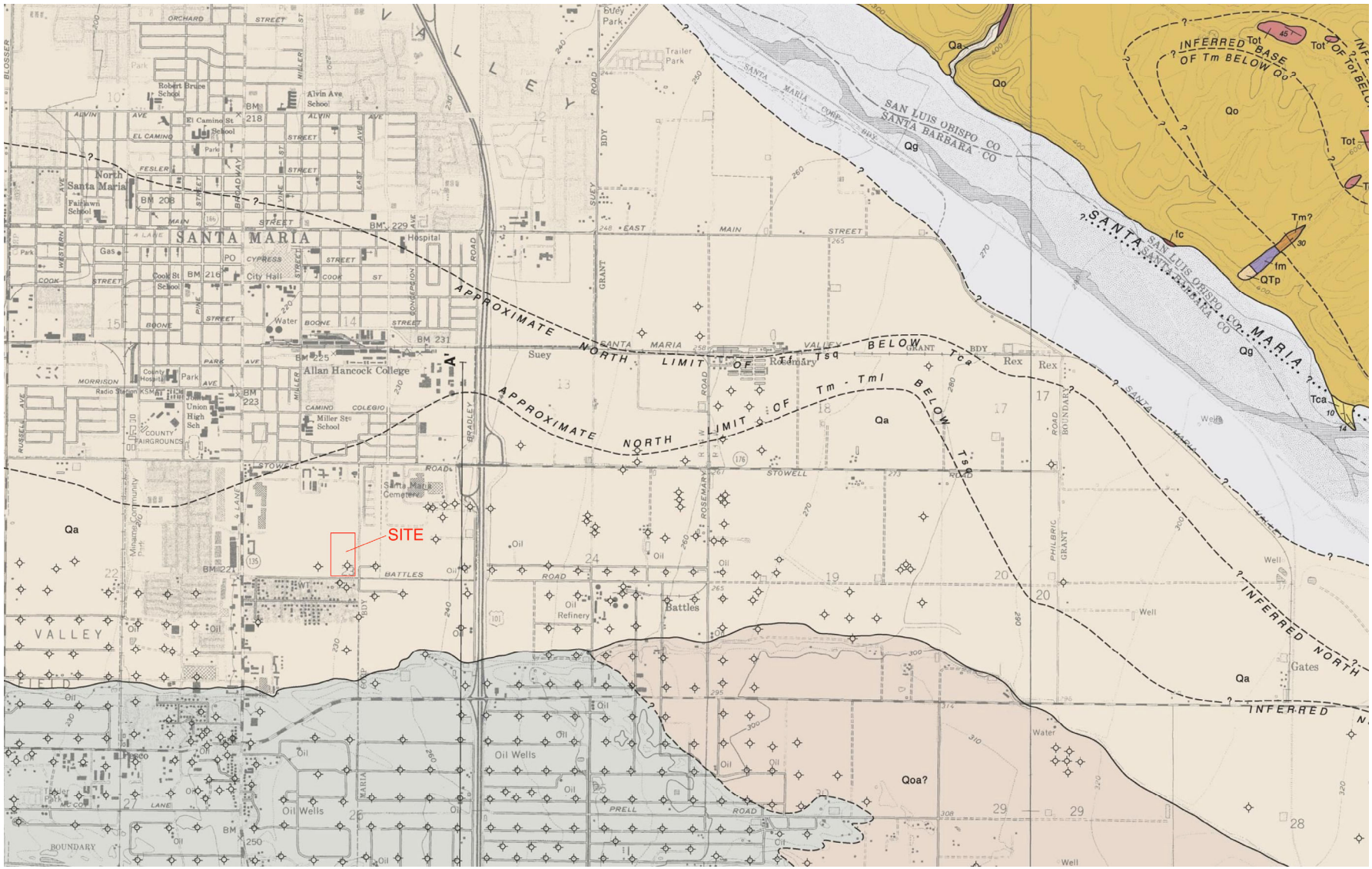
SITE CROSS SECTION

BATTLES ELEMENTARY SCHOOL, 605 E. BATTLES ROAD
SANTA MARIA, CALIFORNIA

PLATE
1C

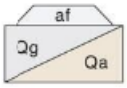
PROJECT
GS00433-2



GeoSolutions, Inc. 220 High Street San Luis Obispo, California 93401 (805) 543-8539	**REGIONAL GEOLOGY MAP (Dibblee, 1994)** BATTLES ELEMENTARY SCHOOL, 605 E. BATTLES ROAD SANTA MARIA, CALIFORNIA	**PLATE** 2A **PROJECT NO:** GS00433-2

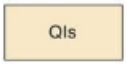
SANTA MARIA AND TWITCHELL DAM MAP

LEGEND



SURFICIAL SEDIMENTS

af *Artificial fill*
Qg *Sand and gravel of stream channels*
Qa *Valley floodplain alluvium*



LANDSLIDE DEBRIS

OLDER ALLUVIUM

Qoa *Dissected alluvial gravel, sand and clay*
Qos *Wind deposited sand*

— UNCONFORMITY —

ORCUTT FORMATION
(Of Hall 1978)

Qo *Tan to rusty brown wind-deposited sand, and alluvial gravel north of Santa Maria River*

— UNCONFORMITY —

PASO ROBLES FORMATION

QTp *Gray, weakly consolidated alluvial gravel, sand, and clay, crudely bedded*

CAREAGA SAND

Tca *Marine, weakly indurated, tan fossiliferous sand, exposed only at and near Fugler Point*

— UNCONFORMITY —

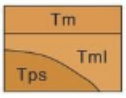
FOXEN CLAYSTONE
(In subsurface only)

Tf *Marine, gray claystone*

SISQUOC FORMATION
(In subsurface only)

Tsq *Marine, gray diatomaceous claystone*

— UNCONFORMITY —

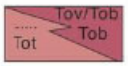


MONTEREY SHALE
Marine, mostly biogenic

Tm *White-weathering, thin-bedded, paty porcelaneous siliceous shale, late Miocene age (Mohnian Stage)*
Tml *Cream-white weathering, thin-bedded to fissile, semi-siliceous shale, with thin tan dolomitic layers, few thin fine-grained sandstone strata (Point Sal Fm. of Hall 1978); middle Miocene age*
Tps *Point Sal Formation (in subsurface only) thin-bedded shale and sandstone (Relizian Stage - Woodring and Bramlette 1950)*

SANDSTONE OF HURRICANE DECK
(Of Dibblee 1991)
Marine; probably early Miocene age

Tmss *Light tan, medium to fine grained, massive sandstone, locally calcareous*



OBISPO FORMATION
(Of Hall and Corbató 1967)
Volcanic rocks

Tot *Light gray pumiceous tuff and tuff-breccia; middle Miocene (15.5-16.5 m.y. - Turner 1970 in Hall 1978); ..... = prominent marker bed*
Tob and Tov/Tob *Basalt/diabase; black, severely weathered flows (?)*

— UNCONFORMITY —

RINCON SHALE

Tr *Marine, gray claystone with yellow dolomite concretions; early Miocene age (Saucesian - late Zemorrian Stage)*

VAQUEROS SANDSTONE

Tvq *Shallow marine transgressive; tan, massive, locally calcareous sandstone; late Oligocene age (Zemorrian Stage)*

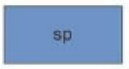
SESPE FORMATION
(Losee Fm. of Hall 1978)

Tsp *Nonmarine red green claystone, sandstone and pebble conglomerate of Franciscan (?) rock detritus; Oligocene age*

— UNCONFORMITY —

CACHUMA FORMATION
Late Cretaceous age

Kcss *Light gray, hard micaceous sandstone, minor clay shale*
Kcsh *Gray micaceous clay shale*



SERPENTINITE

sp *Serpentinite, completely altered from ultramafic igneous rocks; composed of bluish-gray-green serpentine with minute black specks of magnetite; massive amorphous, but pervasively slickensided with shiny surfaces due to expansion during alteration*

FRANCISCAN ASSEMBLAGE

fm *Melange of pervasively sheared dark gray claystone, includes large fragments of:*
fs *Graywacke sandstone*
fc *Varicolored chert*
fg *Greenstone (meta-basalt)*
db *Diabase (Coast Range Ophiolite)*

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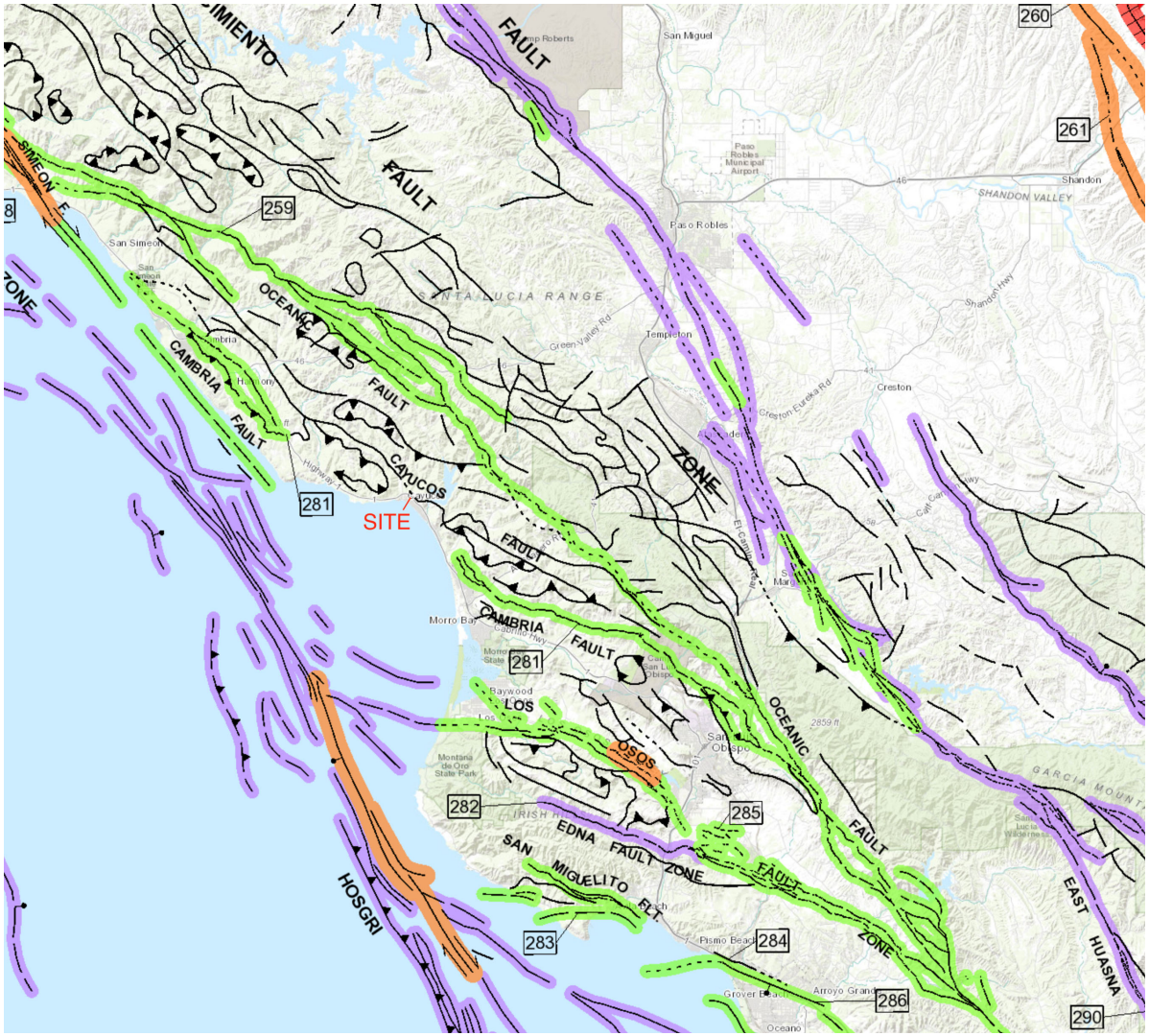
REGIONAL GEOLOGY MAP LEGEND (Dibblee, 1994)

BATTLES ELEMENTARY SCHOOL, 605 E. BATTLES ROAD
SANTA MARIA, CALIFORNIA

PLATE
2B

PROJECT NO:
GS00433-2



FAULT CLASSIFICATION COLOR CODE
(Indicating Recency of Movement)

Fault along which historic (last 200 years) displacement has occurred.

A triangle to the right or left of the date indicates termination point of observed surface displacement. Solid red triangle indicates known location of rupture termination point. Open black triangle indicates uncertain or estimated location of rupture termination point.

Date bracketed by triangles indicates local fault break.

No triangle by date indicates an intermediate point along faultbreak.

Fault that exhibits fault creep slippage. Hachures indicate linear extent of fault creep. Annotation (creep with leader) indicates representative locations where fault creep has been observed and recorded.

Square on fault indicates where fault creep slippage has occured that has been triggered by an earthquake on some other fault. Date of causative earthquake indicated. Squares to right and left of date indicate terminal points between which triggered creep slippage has occurred (creep either continuous or intermittent between these end points).

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement.

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REGIONAL FAULT MAP (Jennings, 2010)

BATTLES ELEMENTARY SCHOOL, 605 E. BATTLES ROAD
SANTA MARIA, CALIFORNIA

PLATE
3

PROJECT NO:
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AERIAL PHOTOGRAPH (Google, 2024)

BATTLES ELEMENTARY SCHOOL, 605 E. BATTLES ROAD
SANTA MARIA, CALIFORNIA

PLATE
4

PROJECT NO:
GS00433-2

APPENDIX A

Boring Logs

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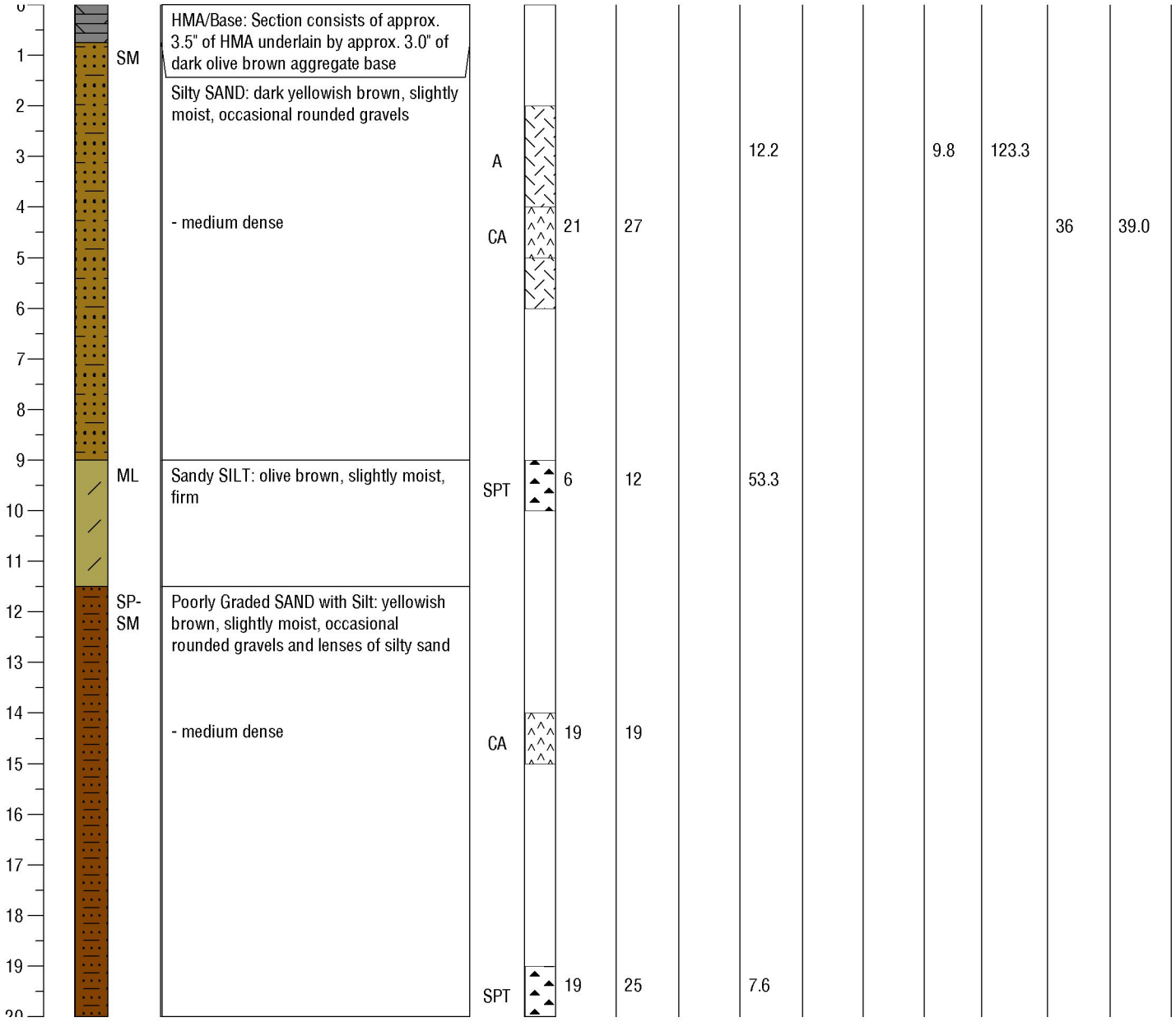
Phone: 805-614-6333
201 S. Milpas St, Ste 103, Santa Barbara, CA 93103
Phone: 805-966-2200

BORING LOG

BORING NO. B-1
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**CME-55**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**8 Inches**
DATE DRILLED:	**April 4, 2024**	SAMPLING METHOD:	**SPT, CA, Bulk**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 229' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **49 Feet**



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BORING LOG

BORING NO. B-1
JOB NO. GS00433-1

PROJECT INFORMATION

PROJECT:	**New TK/K Building - Battles Elementary**
DRILLING LOCATION:	**See Figure 3: Field Exploration**
DATE DRILLED:	**April 4, 2024**
LOGGED BY:	**B. Jagger**

DRILLING INFORMATION

DRILL RIG:	**CME-55**
HOLE DIAMETER:	**8 Inches**
SAMPLING METHOD:	**SPT, CA, Bulk**
APPROX. ELEVATION:	**Approx. 229' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **49 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLER'S TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
21		SP-SM	Poorly Graded SAND with Silt: yellowish brown, slightly moist, occasional rounded gravels and lenses of silty sand												
22															
23															
24			- dense	CA		34	30								
25															
26															
27															
28															
29															
30		ML	Sandy SILT: light olive brown, slightly moist, 6" lense in SPT, firm	SPT		6	6		66.3						
31		SW-SM	Well Graded SAND with Silt: light yellowish brown, slightly moist												
32															
33															
34			- medium dense	SPT		20	23		11.4						
35															
36															
37															
38															
39		SM	Silty SAND: light olive brown, slightly moist, medium dense	SPT		15	16		27.6						
40															

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BORING LOG

BORING NO. B-1
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**CME-55**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**8 Inches**
DATE DRILLED:	**April 4, 2024**	SAMPLING METHOD:	**SPT, CA, Bulk**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 229' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **49 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
41		SM	Silty SAND: light olive brown, slightly moist, medium dense												
42															
43		SP	Poorly Graded SAND: light yellowish brown, dry - Orcutt Formation (Qo)												
44				SPT		74	75		16.8						
45			- very dense												
46															
47			- cobbles												
48				SPT		85	81		15.4						
49															
50															

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Phone: 805-966-2200

BORING LOG

BORING NO. B-2
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**Mobile B-24**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**6 Inches**
DATE DRILLED:	**April 4, 2024**	SAMPLING METHOD:	**SPT, CA**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 230' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **15 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0			Grass: grass/roots												
1		SM	Silty SAND: very dark brown, slightly moist												
2			- dark yellowish brown	D											
3															
4															
5			- medium dense	SPT		18	24								
6			- rounded gravels												
7			- yellowish brown												
8															
9				CA		38	29								
10															
11															
12															
13															
14				SPT		10	10								
15															
16															
17															
18															
19															
20															

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BORING LOG

BORING NO. B-3
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**Mobile B-24**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**6 Inches**
DATE DRILLED:	**April 4, 2024**	SAMPLING METHOD:	**SPT**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 230' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **15 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0			Grass: grass/roots												
1		SM	Silty SAND: dark yellowish brown, slightly moist												
2															
3															
4		SM	Silty SAND with Gravel: yellowish brown, slightly moist, medium dense		SPT	20	27								
5															
6															
7															
8															
9			- light olive brown, medium dense		SPT	16	18								
10															
11															
12															
13															
14			- loose		SPT	9	9								
15															
16															
17															
18															
19															
20															

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BORING LOG

BORING NO. B-4
JOB NO. GS00433-1

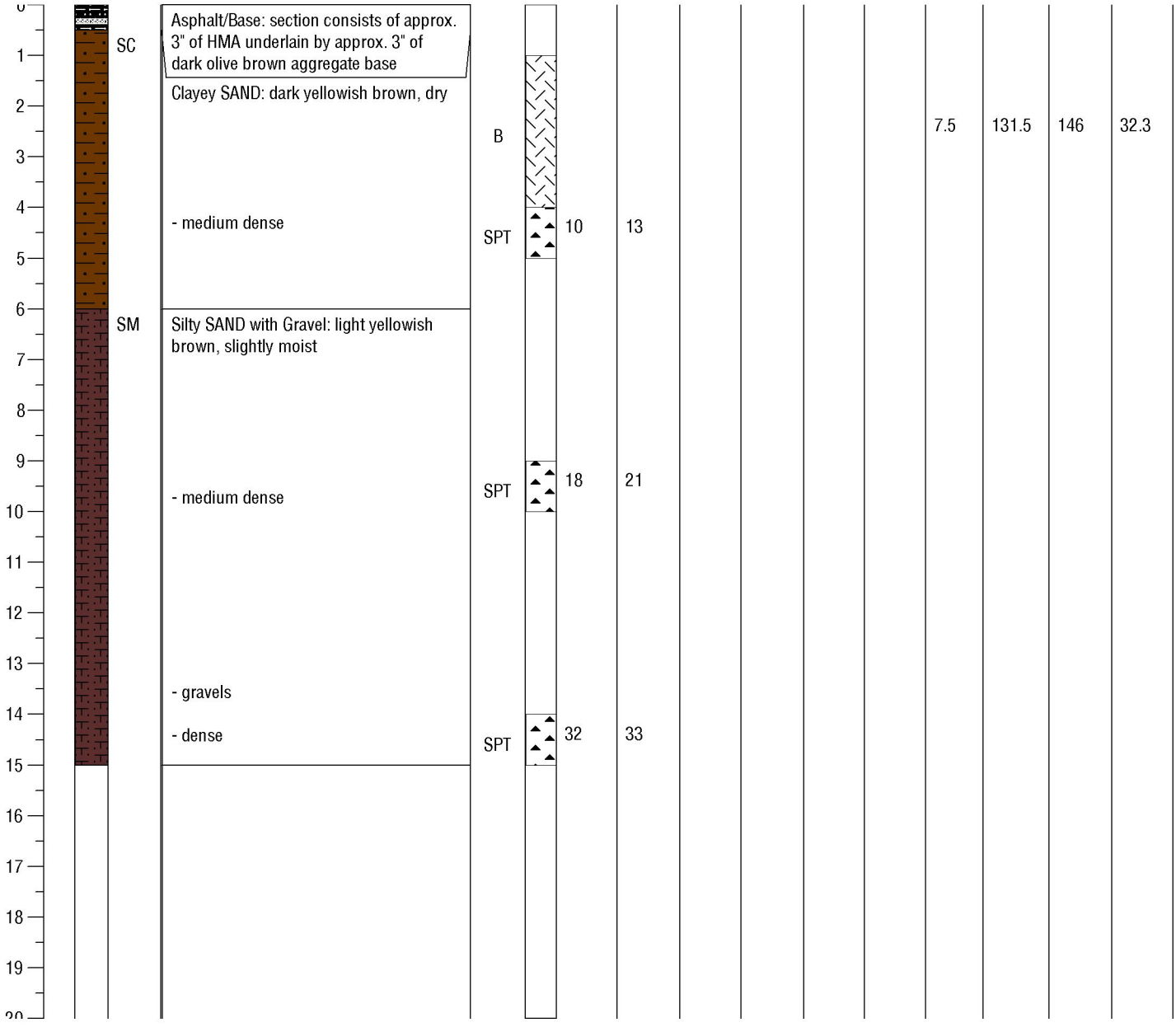
PROJECT INFORMATION

PROJECT:	**New TK/K Building - Battles Elementary**
DRILLING LOCATION:	**See Figure 3: Field Exploration**
DATE DRILLED:	**April 4, 2024**
LOGGED BY:	**B. Jagger**

DRILLING INFORMATION

DRILL RIG:	**Mobile B-24**
HOLE DIAMETER:	**6 Inches**
SAMPLING METHOD:	**SPT, Bulk**
APPROX. ELEVATION:	**Approx. 231' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **15 Feet**



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BORING LOG

BORING NO. B-5
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**Mobile B-24**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**6 Inches**
DATE DRILLED:	**April 5, 2024**	SAMPLING METHOD:	**SPT**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 230' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **15 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0			Asphalt/Base: section consists of approx. 3.5" of HMA underlain by approx. 3" of dark olive brown aggregate base												
1		SM	Silty SAND: dark yellowish brown, slightly moist												
2															
3				C											
4		SP-SM	SAND with Silt: yellowish brown, slightly moist, medium dense	SPT		16	21								
5															
6															
7															
8			- cobble												
9			- loose	SPT		9	10								
10		ML	Sandy SILT: dark yellowish brown, slightly moist												
11															
12															
13															
14		SP-SM	Poorly Graded SAND with Silt: yellowish brown, occasional gravels, slightly moist, medium dense	SPT		19	20								
15															
16															
17															
18															
19															
20															

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Phone: 805-966-2200

BORING LOG

BORING NO. B-6
JOB NO. GS00433-1

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**New TK/K Building - Battles Elementary**	DRILL RIG:	**Mobile B-24**
DRILLING LOCATION:	**See Figure 3: Field Exploration**	HOLE DIAMETER:	**6 Inches**
DATE DRILLED:	**April 5, 2024**	SAMPLING METHOD:	**SPT**
LOGGED BY:	**B. Jagger**	APPROX. ELEVATION:	**Approx. 230' NAVD 88**

Depth of Groundwater: **Not Encountered** Boring Terminated: **15 Feet**

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0			Asphalt/Base: section consists of approx. 3.5" of HMA underlain by approx. 3" of dark olive brown aggregate base												
1		SM	Silty SAND: dark yellowish brown, slightly moist												
2															
3															
4		SP-SM	SAND with Silt: yellowish brown, slightly moist, medium dense	SPT		24	32								
5															
6															
7															
8															
9				CA		13	10								
10		ML	Sandy SILT: dark yellowish brown, slightly moist												
11															
12															
13															
14		SP-SM	Poorly Graded SAND with Silt: yellowish brown, occasional gravels, slightly moist, medium dense	SPT		20	21								
15															
16															
17															
18															
19															
20															