

November 14, 2024

HMC Architects Project No. 3431007

DSA File and Application No. 39-50 / 02-122910

PTN: 68585-271

ADDENDUM NO. 02

Lodi Middle School Additions and Modernization – HVAC Replacement

Lodi, California

HMC Architects

1. ALL WORKMANSHIP, MATERIALS, APPLIANCES AND EQUIPMENT which may be included in the following items shall be the same relative quantity as described for similar work set forth in the original or main specifications of which these Addendum items shall be considered a part.

2. ADDENDUM SECTIONS (included with this Addendum)
The following modify or supplement the issued bid documents.

Preliminary Project Description	REPLACE Element C Interiors
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3. ADDENDUM DRAWINGS (included with this Addendum)
The following modify or supplement the issued bid documents.

AD2.01	REPLACE Sheet AJ2.11
AD2.02	REPLACE Sheet AJ3.11
AD2.03	REPLACE Sheet AJ4.11
AD2.04	REPLACE Sheet AJ5.11
AD2.04	REPLACE Sheet AJ8.11

4. PRELIMINARY PROJECT DESCRIPTION

A. Element C Interiors:

1. DELETE element in its entirety and REPLACE with the attached Element C.

5. DRAWINGS

A. AJ2.11, Dimension Plan - Unit J:

1. DELETE sheet in its entirety and replace with Sheet AD2.01. included with this addendum.

B. AJ3.11, Reflected Ceiling Plan – Unit J:

1. DELETE sheet in its entirety and replace with Sheet AD2.02. included with this addendum.

C. AJ4.11, Roof Plan – Unit J:

1. DELETE sheet in its entirety and replace with Sheet AD2.03. included with this addendum.

D. AJ5.11, Exterior Elevations – Unit J

1. DELETE sheet in its entirety and replace with Sheet AD2.04. included with this addendum.

E. AJ8.11, Interior Elevations – Unit J

1. DELETE sheet in its entirety and replace with Sheet AD2.05. included with this addendum.

6. GENERAL INFORMATION

A. Please see below for answers to the Pre-Bid RFI questions:

1. Please confirm that the owner will carry the architect of record.
A: Confirmed.

2. Will a Geotech report be available before the RFP/Q is due? This can affect design costs.
A: The Geotechnical Report is attached to this addendum.
3. Please confirm that the new buildings are to be designed as slab on grade and a raised floor system design will not be allowed.
A: Please see Preliminary Project Description Element A and building sections.
4. Please confirm that fire sprinkler design costs are not required for this proposal.
A: Bidders shall include fire protection design within their proposal.
5. Please confirm that DVBE requirements are not required for the RFP/Q submission but are required for the GMP submission.
A: Correct
6. Is the proposing contractor to include code analysis in their design costs? This is relative to possible fire walls, building separations, fire sprinkler requirements, etc
A: A preliminary code analysis has been done, but the proposing contractor shall be responsible for code analysis within their scope of work.
7. Is the low voltage design (telecom, data, clock/bell, AV, fire alarm, cameras, and EMS) to be included in this proposal? If design costs are to be included in this proposal, please provide information on electrical site systems (type of system, Manufacturer, P.O.C. locations, etc).
A: Low voltage design shall be included by the architect of record.
8. Under Tab 8 "Pricing and Contingency", this paragraph is directing the proposing contractor to outline their construction contingency (item 5), and allowances (item 6), if any. Are either of these items to be credited back to the district if not used?
A: Correct.
9. Under tab 8 "Pricing and Contingency", are the (3) General Conditions costs to be shown as a monthly cost or as a percentage of the overall project budget?
A: Monthly Cost.
10. Is the proposing contractor to provide Acoustical engineering Design services and Food Service Design?

A: Acoustical engineering and food service design have been included in the design by the architect of record. The proposing contractor shall be responsible for coordination within their set of documents.

11. Please confirm M/E/P/FP engineering services are to be provided by this proposing contractor.

A: Mechanical, Plumbing, Electrical, Fire Protection, Photovoltaic and Structural engineering shall be provided by the proposing contractor.

12. Please confirm Inc. 3 classroom buildings (H1 and H2) and Inc. 4 Gym (J) are both included in this RFP/Q.

A: All buildings included within this package are to be included within this RFP/Q: P2, H1, H2, and J.

13. Under Tab 8, are Contingency and Allowance for preconstruction services or for the entire duration of the project?

A: Entire Project.

14. Exhibit H mentions an attached project labor agreement, please confirm this project has no Project Labor Agreement.

A: No PLA for this project.

15. Will a PV system be required for this project? If so who is responsible for the PV system design?

A: The proposing contractor is responsible for the PV system and engineering as shown on the documents.

16. If PV system is required for this project, can PV be placed on shade canopies in the parking lot?

A: The PV system shall be located on the roof of Unit J as shown on AJ4.11.

17. If PV system is required, does the district want battery backup, if so where will batteries be stored?

A: Yes; Battery backup should be stored in (climate controlled) electrical room.

18. Is this project covered by OCIP?

A: Yes.

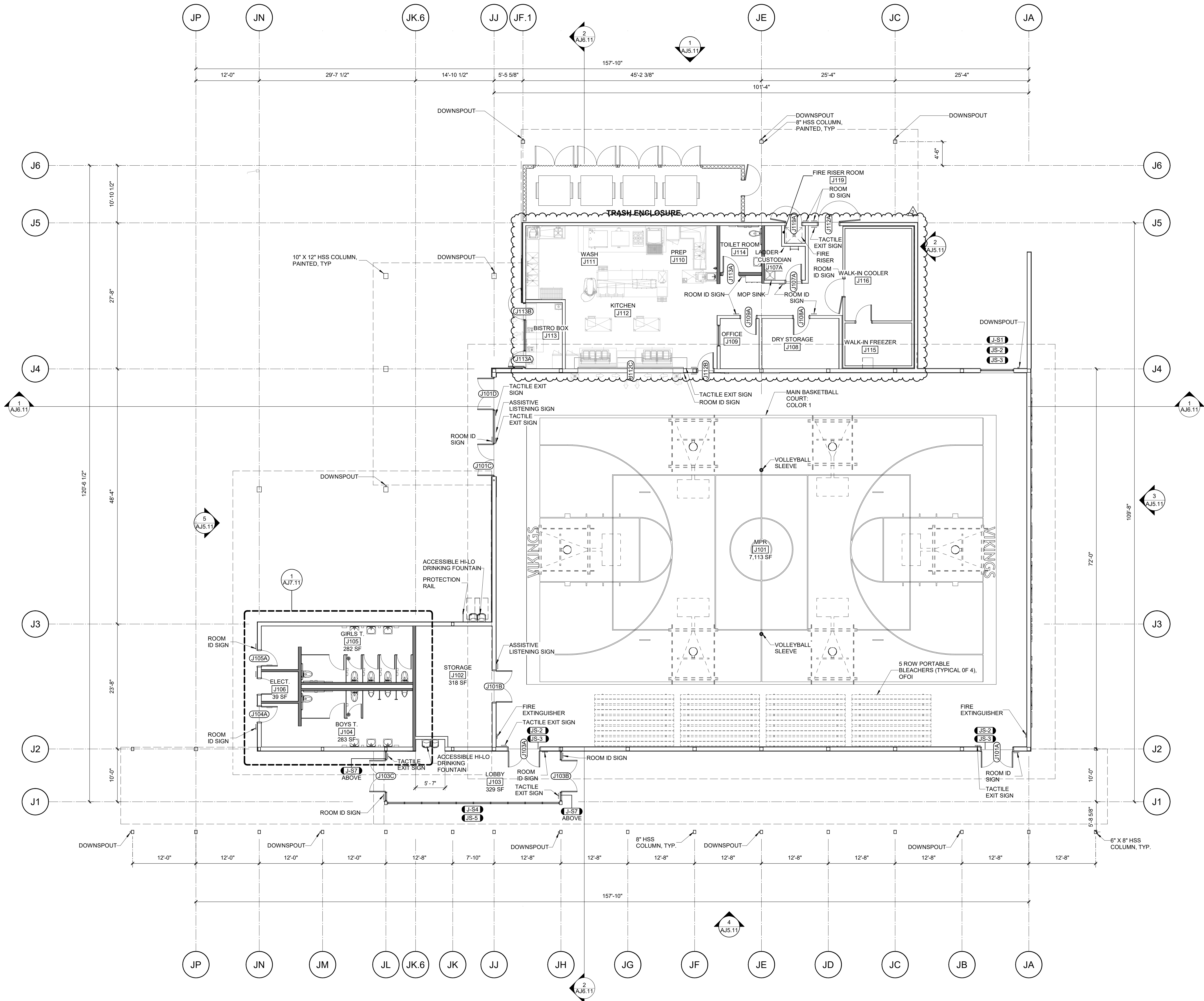
19. Are there any HVAC/Kitchen Equipment items that require Gas?

A: Please see FS1.1 for kitchen equipment list. The kitchen is expected to be fully electric.

* * * END OF ADDENDUM * * *

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LEGEND	
	METAL STUD WALL
	CMU WALL
	METAL STUD WALL WITH SOUND CONTROL INSULATION, FULL DEPTH OF CAVITY

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GENERAL NOTES

- ALL DOWNSPOUTS SHALL BE PAINTED TO MATCH ADJACENT SURFACES.
- ALL DOWNSPOUTS SHALL BE CONNECTED TO STORM DRAIN SYSTEMS.
- ALL DOWNSPOUTS SHALL BE 3" ROUND, SCHEDULE 40 STEEL DOWNSPOUT, PAINTED TO MATCH BODY COLOR.
- ALL ATHLETIC EQUIPMENT SHALL BE AS MANUFACTURED BY PORTER OR EQUAL. EQUIPMENT SHALL INCLUDE:
 - A. Basketball Backstop - Forward Fold Unit: "Center-Strut" ceiling suspended, forward fold, front braced, with bent frame; Porter No. 950 Series.
 - C. Equipment Controller: Provide Simultaneous Operation Gymnasium Control Center; Porter No. 02555-000 "POWER TOUCH 2.5".
 - D. Indoor Volleyball Standard Sleeves; shall accommodate 3-1/2 inch outside diameter posts. Provide 1 complete set of sleeves and standards. In fixed type floors, provide sleeves with a 5 inch diameter cover; Porter No. 870 Series sleeves.
 - E. Indoor Volleyball System: Porter 19611 Series package.
 - F. Wall Pads: Gymnasium Wall Padding with 1 inch Nailing Margins; Porter No. 5600 Series "DuraSafe" Gymnasium Wall Pad, or equal.
 - G. Indoor Scoreboard: Single-sided LED scoreboard with horn, providing scoring capabilities for two teams, with 100 percent solid state electronics housed in an aluminum cabinet; Daktronics No. BB-2101 Series, 4'x8' with "PanaView" LED digit technology, or equal.
- COLORS AND FINISHED FOR ALL ATHLETIC EQUIPMENT SHALL BE AS SELECTED BY ARCHITECT FROM MANUFACTURER'S STANDARD FINISHED AND COLORS

FACILITY:
LODI MIDDLE SCHOOL
945 SOUTH HAM LANE
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PROJECT:
LODI MIDDLE SCHOOL ADDITIONS AND
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INCREMENT 4
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DIMENSION PLAN - UNIT J

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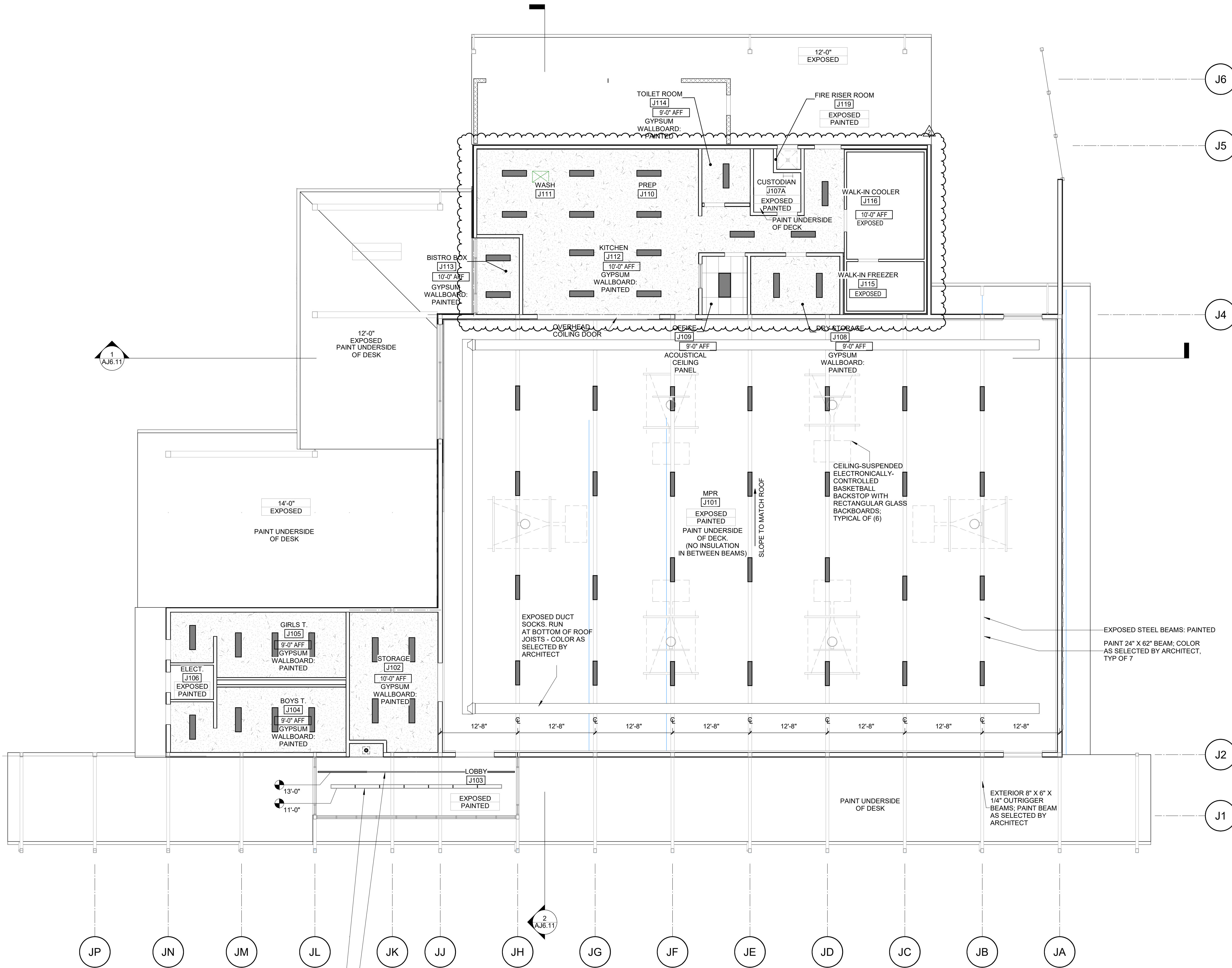
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OVERALL FLOOR PLAN - UNIT J 1
1/8" = 1'-0"

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AJ2.11
AD2.01

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28' L SUSPENDED LINEAR LIGHT FIXTURE, LITECONTROL AIRA BY CURRENT LIGHTING W/ (7) 4' SEGMENTS LINKED TOGETHER, PROVIDE SWIVEL STEM MOUNTING AND ALTERNATING CUSTOM COLOR (RX) CROSSBAR INSERTS, 2 COLORS TOTAL, CENTER FIXTURE IN ROOM.

32' L PENDANT LINEAR WALL WASH FIXTURE, UBIK PENDANT BY LUMENWERK W/ (4) 8' SEGMENTS LINKED TOGETHER, PROVIDE WALL WASH OPTICS AND FIELD CUTTABLE RIGID STEM.

LEGEND - RCP'S

- BUILDING ELEMENTS**
- GYPSUM WALLBOARD, PLASTER, OR STUCCO CEILING - REF: CEILING TAGS
 - 24"x48" ACOUSTIC TILE CEILING SYSTEM - REF: CEILING TAGS AND SPECIFICATIONS
 - SURFACE MOUNTED LIGHT FIXTURE (SHAPES WILL VARY)
 - RECESSED LIGHT FIXTURE (SHAPES WILL VARY)
 - RECESSED CAN LIGHT FIXTURE (SHAPES WILL VARY)
 - SUSPENDED LINEAR LIGHT FIXTURE (SHAPES WILL VARY)
 - RETURN AIR GRILLE (SHAPES WILL VARY)
 - SUPPLY AIR GRILLE (SHAPES WILL VARY)
 - X-XX'-" HEIGHT ABOVE FINISH FLOOR

GENERAL NOTES- PARTIAL RCP'S

- DIMENSIONS TO FACE OF PARTITIONS ARE TO FACE OF SUBSTRATE LAYER AS SHOWN IN PARTITION TYPES ON A0.11. FINISHES DEPICTED IN FINISH PLANS AND ELEVATIONS ARE NOT SHOWN ON PARTIAL FLOOR PLANS. REFER TO ENLARGED PLANS, ELEVATIONS, AND DETAILS.

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NOTES

- ALL EXPOSED DUCTING IN THE MULTIPURPOSE ROOM J101 SHALL BE AS MANUFACTURED BY DUCTSOX CORP OR EQUAL. BASIS OF DESIGN SHALL BE BASED ON SKELECORE FTS. COLOR AS SELECTED BY ARCHITECT FROM MANUFACTURER'S EXTENDED RANGE OF COLORS

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REFLECTED CEILING PLAN - UNIT J

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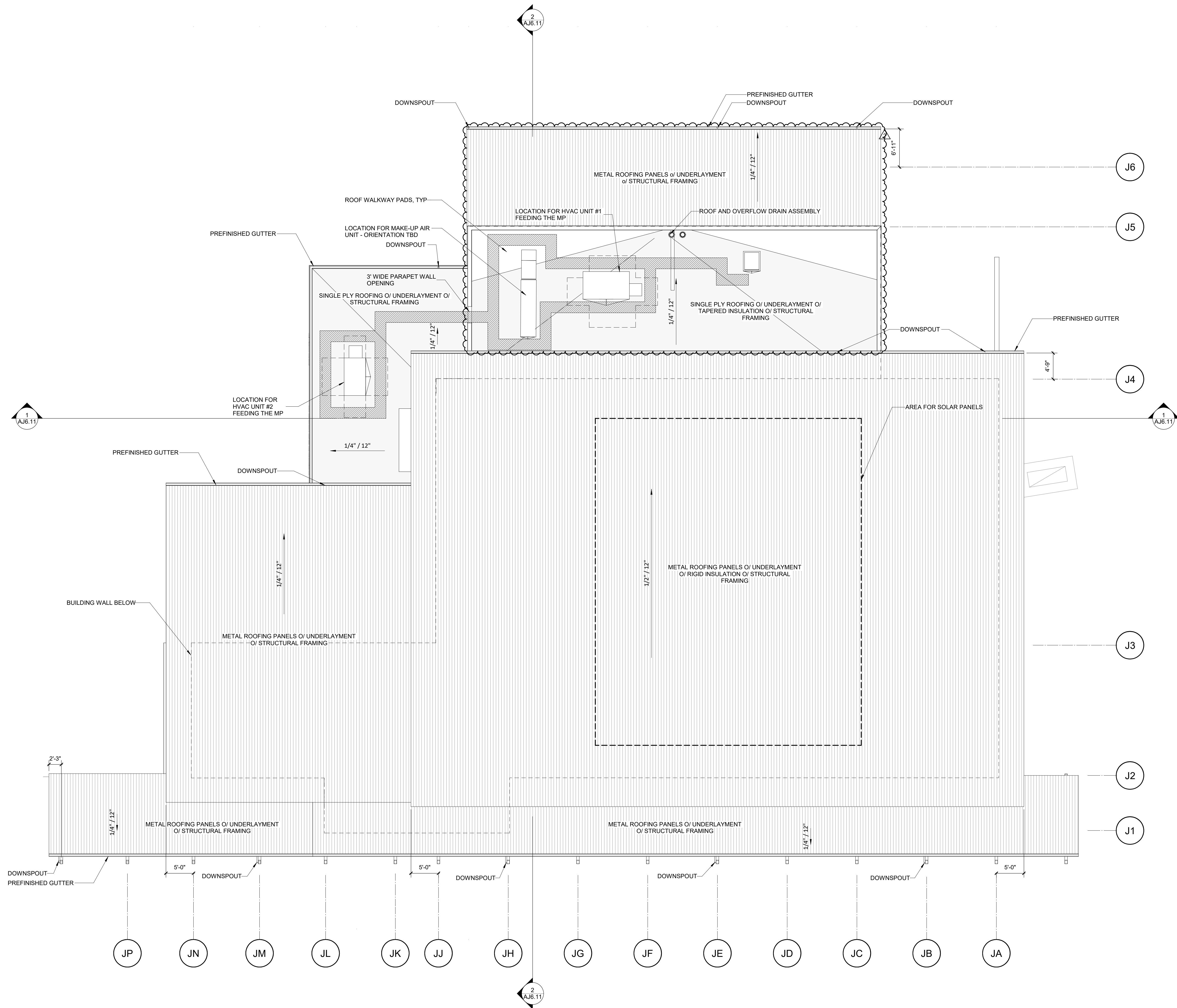
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1ST FLOOR - RCP **1**
1/8" = 1'-0"

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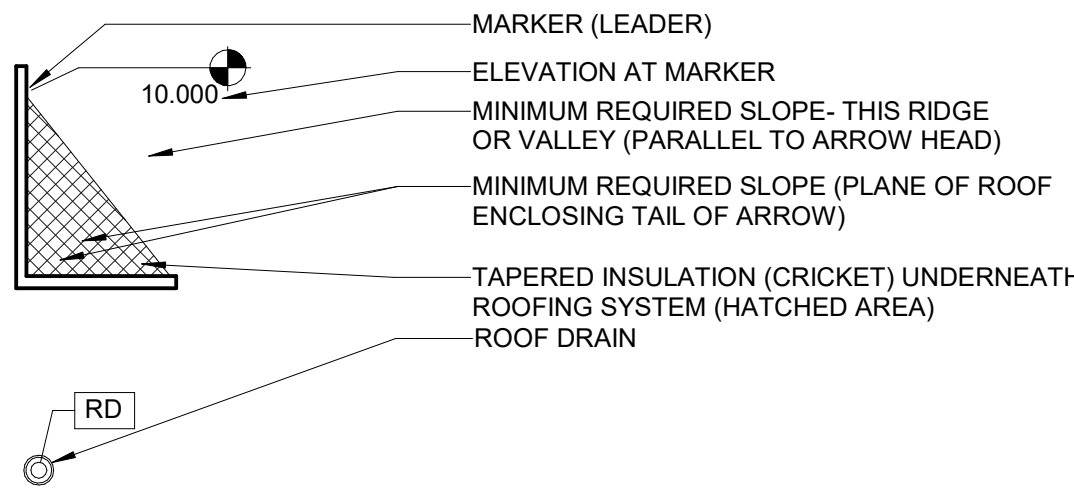
AJ3.11
AD2.02

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LEGEND- ROOF PLANS

BUILDING ELEMENTS



GENERAL NOTES

1. ALL GUTTERS SHALL BE 24 GA. METAL, PREFINISHED. COLOR TO BE SELECTED BY ARCHITECT

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NOTES

1. SOLAR AREA SHALL ACCOUNT FOR BUILDINGS J, H-1, AND H-2. FINAL SIZING SHALL BE DETERMINED BY THE BUILDING MANUFACTURER AS REQUIRED BY CODE. DESIGN OF SOLAR SYSTEM SHALL BE PROVIDED BY MANUFACTURER, INCLUDING ALL REQUIREMENTS OF BATTERY STORAGE, ETC. WHERE APPLICABLE.

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ROOF PLAN - UNIT J

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ROOF PLAN - UNIT J

1

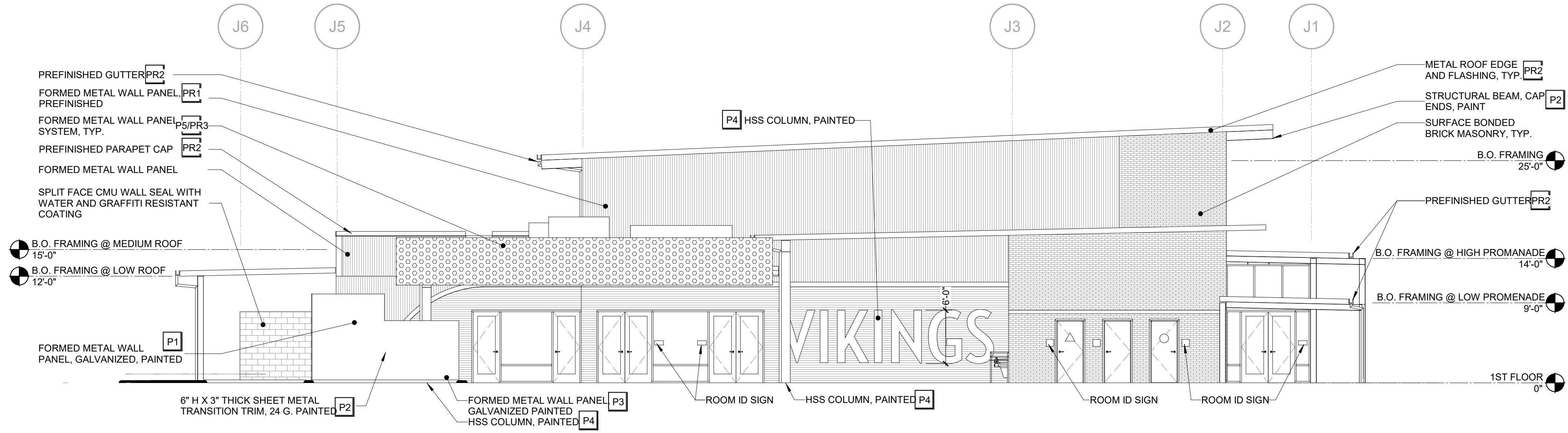
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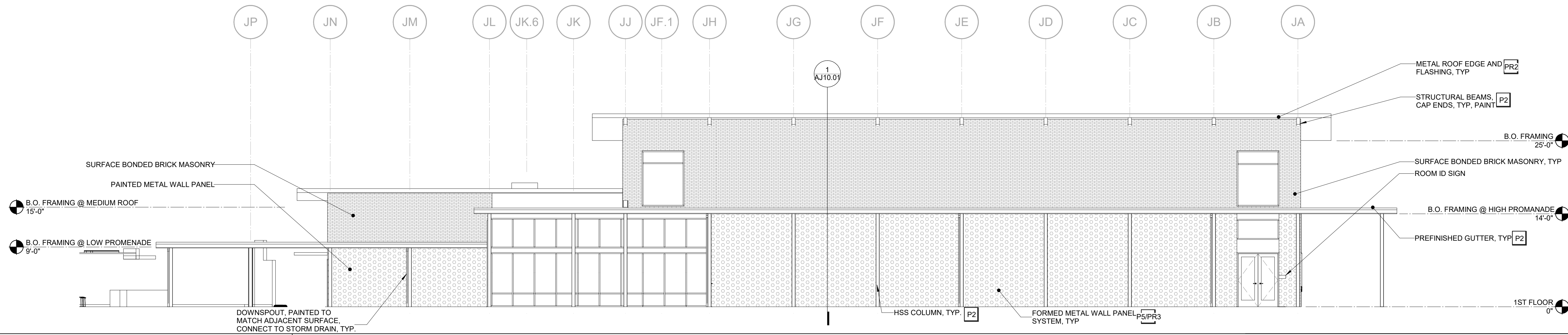
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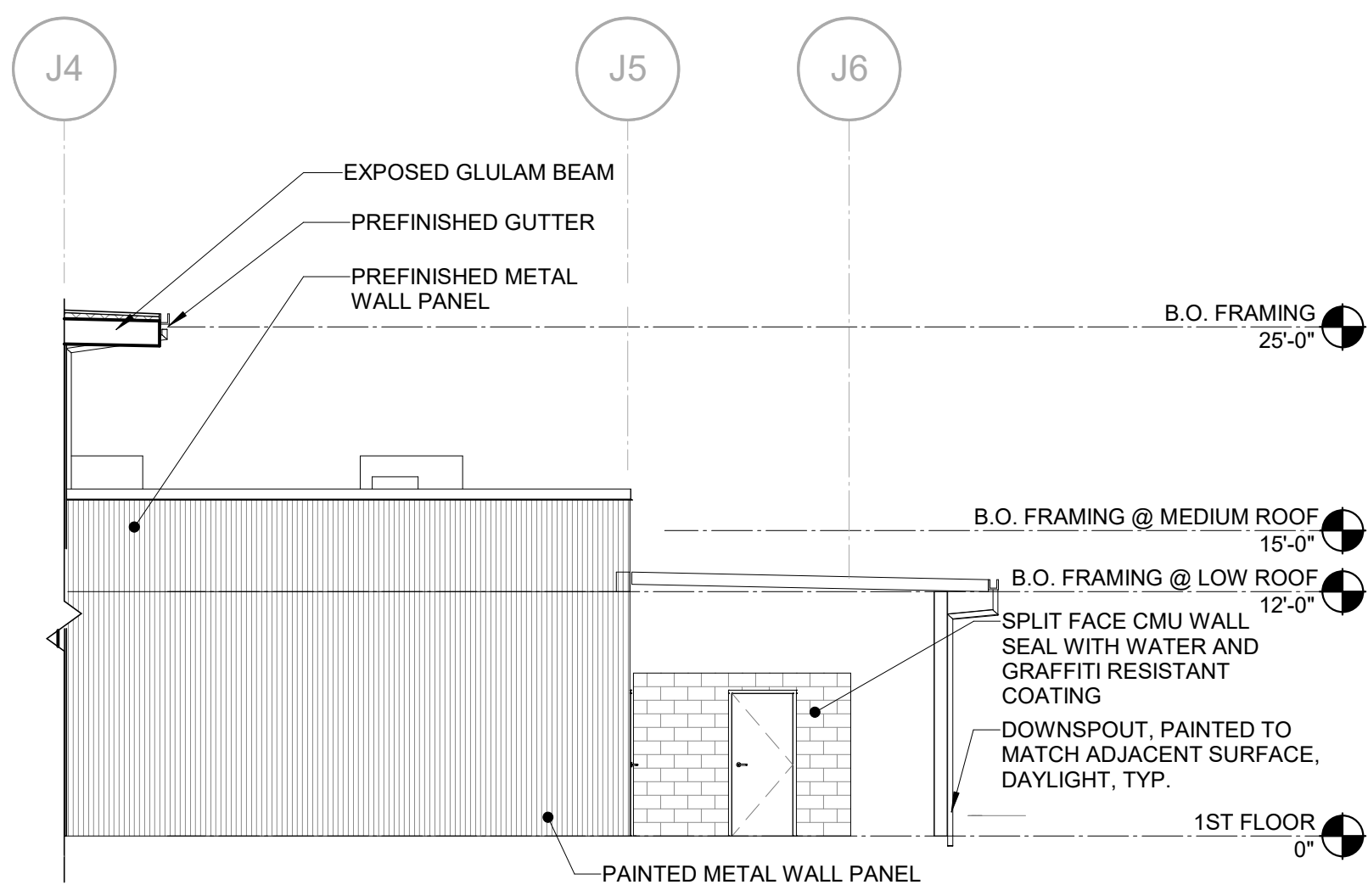
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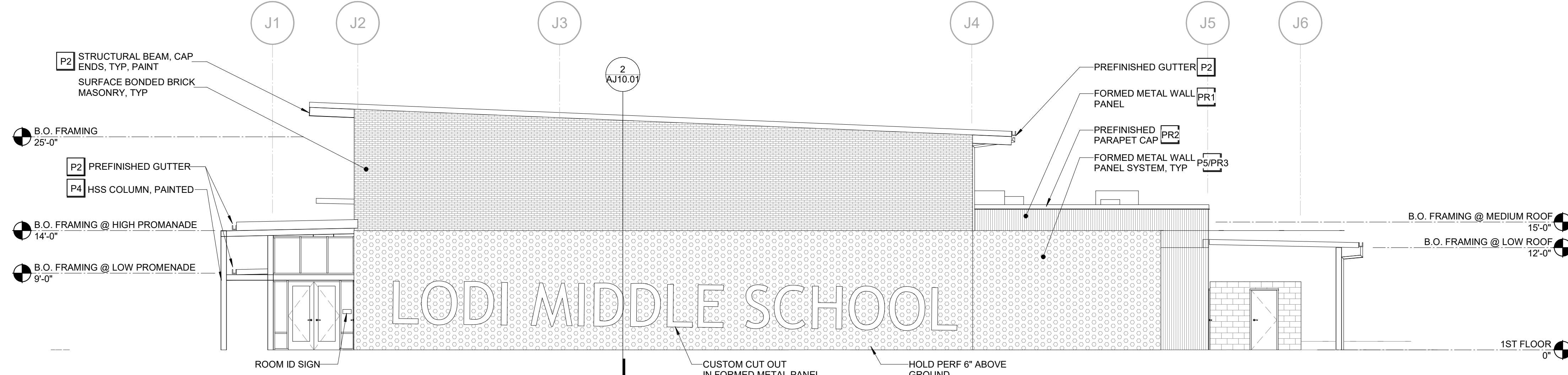
BLDG J - WEST ELEVATION 5
1/8" = 1'-0"



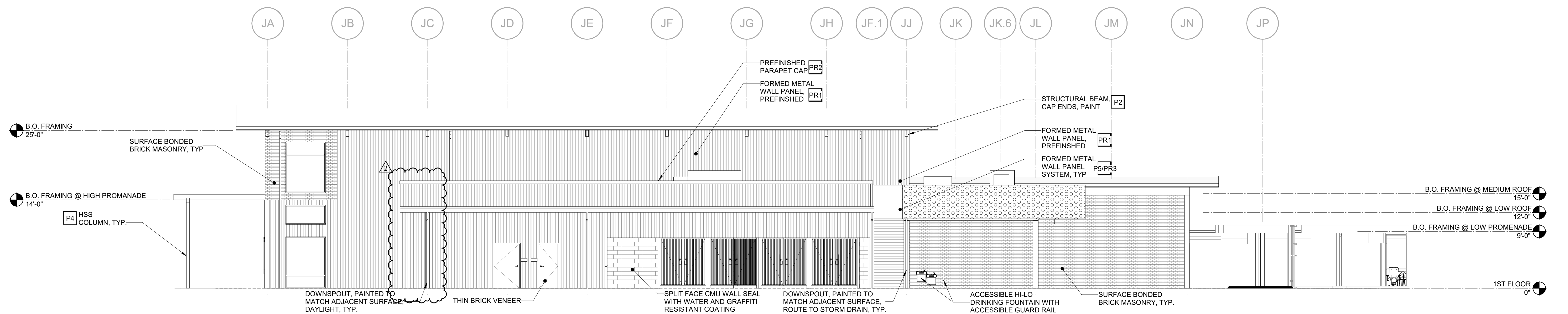
BLDG J - SOUTH ELEVATION 4
1/8" = 1'-0"



BLDG J - EAST ELEVATION 2
1/8" = 1'-0"



BLDG J - EAST ELEVATION 3
1/8" = 1'-0"



BLDG J - NORTH ELEVATION 1
1/8" = 1'-0"

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EXTERIOR COLOR SCHEDULE

	COLOR	MATERIAL
P1	PAINT COLOR 1	METAL
P2	PAINT COLOR 2	METAL
P3	PAINT COLOR 3	METAL
P4	PAINT COLOR 4	METAL
P5	PAINT COLOR 5	METAL
PR1	PREFINISHED COLOR 1	METAL
PR2	PREFINISHED COLOR 2	METAL
PR3	PREFINISHED COLOR 3	METAL

- FORMED METAL WALL PANELS, EM15-1226 SD MANUFACTURED BY METAL SALES OR EQUAL, 12" WIDE, 24 GA. GALVANIZED, PANELS SHALL BE ORIENTED VERTICALLY. FINISH PER ELEVATIONS; COLOR AS SELECTED BY ARCHITECT
- FORMED METAL WALL PANELS, EM15-1226 AS MANUFACTURED BY METAL SALES OR EQUAL, 12" WIDE, 24 GA. GALVANIZED, PANELS SHALL BE ORIENTED HORIZONTALLY. FINISH PER ELEVATIONS; COLOR AS SELECTED BY ARCHITECTS
- FORMED METAL WALL PANEL SYSTEM: TWO LAYERS OF FORMED METAL WALL PANELS AS MANUFACTURED BY HENDRICK OR EQUAL, ANODIZED ALUMINUM; SITE PAINTED COLOR AS SELECTED BY THE ARCHITECT. PERFORATIONS DESIGN SHALL BE CUSTOM AS DESIGNED BY THE ARCHITECT. FINAL DESIGN SHALL BE COORDINATED WITH ARCHITECT DURING SUBMITTALS. SEE DETAIL A FOR A SAMPLE OF PERFORATIONS DESIGN. INTERIOR FORMED METAL WALL PANEL LAYER: VERTICAL SEAM STRIATED METAL WALL PANELS AS MANUFACTURED BY METAL SALES OR EQUAL, 26 GA. GALVANIZED, PVDF COATED; COLOR TO BE SELECTED BY ARCHITECT FROM MANUFACTURER'S EXTENDED RANGE OF COLORS.
- SURFACE BONDED BRICK MASONRY: COLOR TO MATCH EXISTING BUILDING; 2 COLORS MIN. CONTRACTOR SHALL SUBMIT COLOR MIXES AS FOLLOWS: 80/20, 75/25, 70/30, FOR ARCHITECT'S REVIEW. COLORS TO BE SELECTED FROM MANUFACTURER'S STANDARD RANGE OF COLORS.

NOTES

- FOR ALL ITEMS NOTED AS PREFINISHED, COLOR SHALL BE SELECTED BY ARCHITECT FROM MANUFACTURER'S EXTENDED RANGE OF COLORS.
- ALL EXTERIOR METAL DOOR FRAMES AND DOORS SHALL BE PAINTED P2.

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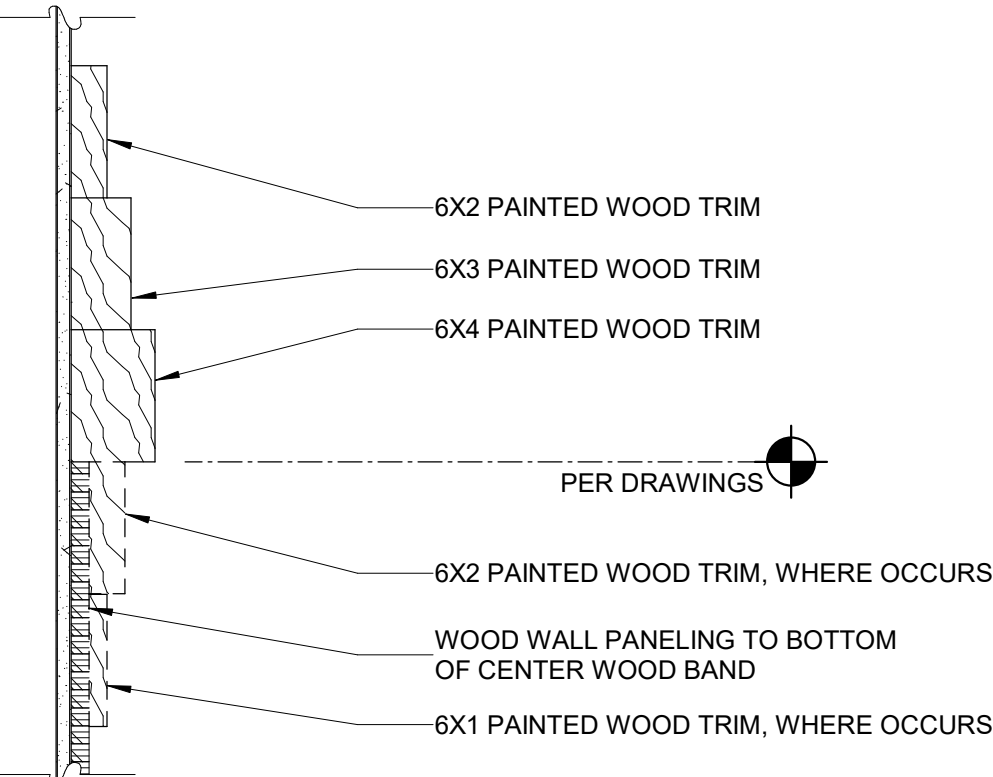
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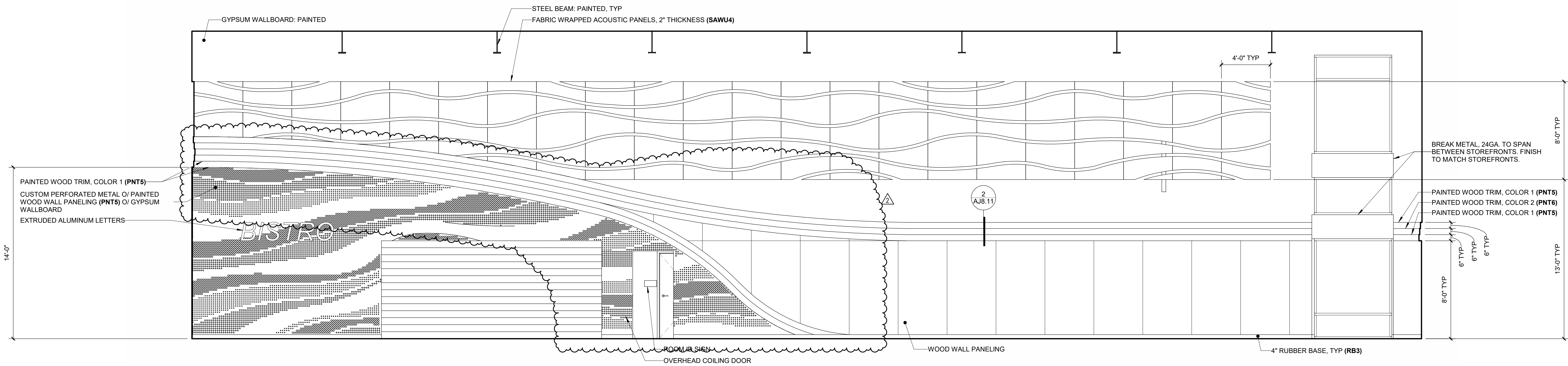
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AJ5.11
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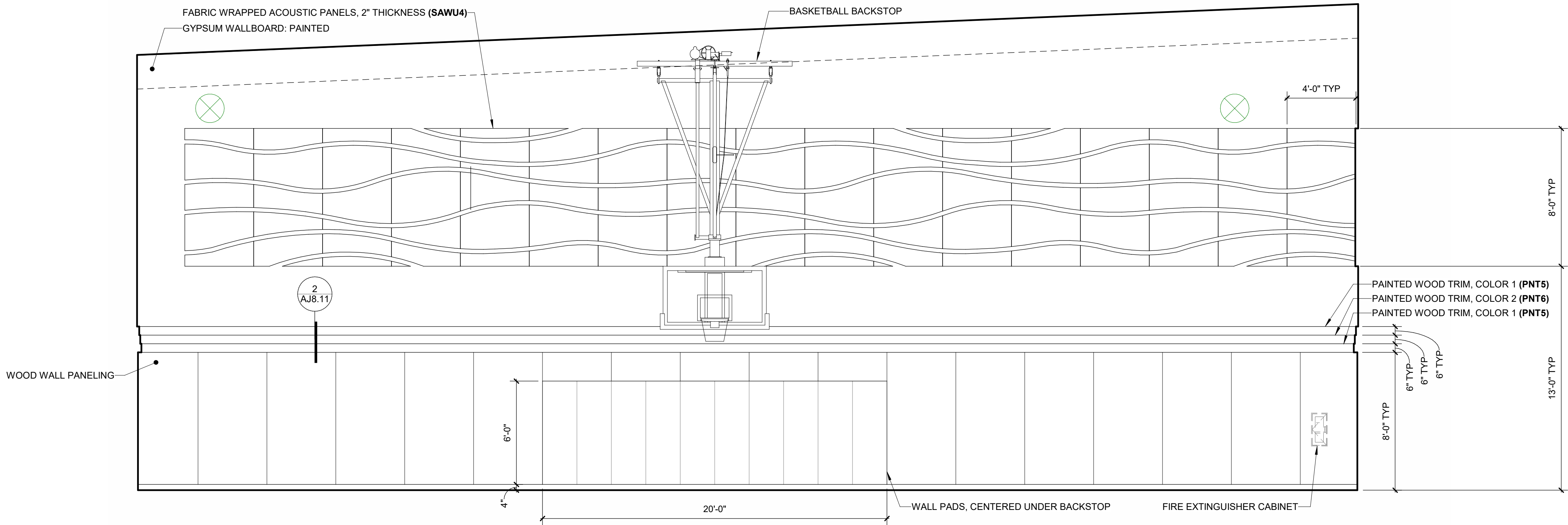
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						WOOD BANDS 2 1 1/2" = 1'-0"



J101 MPR **1A**
1/4" = 1'-0"



J101 MPR **1B**
1/4" = 1'-0"

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KEYNOTES

NOTES

- PERFORATED METAL PANELS SHALL BE SUPPLIED WITH A CUSTOM PERFORATION DESIGN. DESIGN SHOWN IS A SAMPLE OF THE FINAL DESIGN. DESIGN SHALL BE FINALIZED BY ARCHITECT DURING SUBMITTALS.

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INTERIOR ELEVATIONS - UNIT J

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AJ8.11
AD2.05

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LODI, CALIFORNIA
PRELIMINARY PROJECT DESCRIPTION
14 AUGUST 2024

C - INTERIORS

C 10 - INTERIOR CONSTRUCTION

C 1010 Interior Partitions

C 1010.001 Shaft Wall Assemblies

- A. Description: Gypsum board shaft wall assemblies.
- B. Functional Requirements:
 - 1. Sustainable Design Requirements:
 - a. Gypsum Board: Comply with the following:
 - 1) VOC Emissions Evaluation: Tested in accordance with CDPH Standard Method v1.1 or later.
- C. Components:
 - 1. Gypsum Board: 5/8 inch thick Type X, or Type C panels as required by fire-resistance rated designs.
 - 2. Metal Studs: 20 gage minimum thickness.
 - 3. Gypsum Shaftliner Board: 1 inch thick Type X panels.

C 1010.002 Interior Fixed Partitions

- A. Description: Gypsum board over non-structural metal stud framing.
- B. Functional Requirements:
 - 1. Sustainable Design Requirements:
 - a. Gypsum Board: Comply with the following:
 - 1) VOC Emissions Evaluation: Tested in accordance with CDPH Standard Method v1.1 or later.
 - b. Insulation: Comply with the following:
 - 1) VOC Emissions Evaluation: Tested in accordance with CDPH Standard Method v1.1 or later.
- C. Components:
 - 1. Gypsum Board: 5/8 inch thick Type X panels.
 - 2. Metal Studs: 20 gage minimum thickness.
 - 3. Acoustic Insulation: Mineral fiber blanket insulation.
 - 4. Accessories:
 - a. Custom-fabricated metal edge at outside corners.

C 1010.003 Interior All-Glass Partitions

- A. Description: Fully tempered, frameless glass partitions and doors.
- B. Components:

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LODI, CALIFORNIA
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1. Glazing: 1/2 inch thick, clear, fully tempered.

C 1010.004 Interior Aluminum Frames

- A. Description: Partitions primarily composed of glazed elements that may be fabricated or field constructed using aluminum frames.
- B. Components:
 1. Framing: Extruded aluminum, clear anodized.
 2. Glazing: 1/4 inch thick, clear, fully tempered glass.
 3. Doors: Swing, aluminum-framed glass doors.

C 1010.005 Interior Operable Partitions

- A. Description: Acoustically-rated, manually or motor operated panel partitions supported from an overhead track for interior use.
- B. Functional Requirements:
 1. Sound Transmission: STC 52.
- C. Components:
 1. Panels: Constructed with a perimeter frame of cold-formed welded steel with face sheets of sheet metal permanently attached to the frame.
 2. Pass Doors: Swinging doors built into and matching panel construction, finish and thickness, complete with frames and operating hardware.

C 1020 Interior Windows

C 1020.001 Interior Fixed Windows

- A. Description: Hollow metal framed borrowed lite units.
- B. Functional Requirements:
 1. Sustainable Design Requirements:
 - a. Paints and Coatings: Comply with the following:
 - 1) VOC Content: Comply with limits in CARB 2007 SCM for Architectural Coatings, or SCAQMD Rule 1113.
 - 2) VOC Emissions Evaluation: Tested in accordance with CDPH Standard Method v1.1 or later.
- C. Components:
 1. Frame: Steel, factory primed, field painted frames.
 2. Glazing: 1/4 inch thick, clear, security glazing.

C 1020.002 Interior Pass Windows

- A. Description: Metal framed, operable or fixed window with transaction pass functions.
- B. Functional Requirements:
- C. Components:

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LODI, CALIFORNIA
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1. Frame: Metal perimeter and mullion framing.
2. Glazing: 1/4 inch thick, clear, fully tempered glass.

C 1030 Interior Doors

C 1030.001 Interior Swinging Doors

- A. Hollow Metal Doors and Frames
 1. Description: Steel, face-welded frame construction.
 2. Functional Requirements:
 - a. Performance Requirements: Complying with duty level SDI A250.8, Level 2.
 - b. Sustainable Design Requirements:
 - 1) Paints and Coatings: Comply with the following:
 - a) VOC Content: Comply with limits in CARB 2007 SCM for Architectural Coatings, or SCAQMD Rule 1113.
 - b) VOC Emissions Evaluation: Tested in accordance with CDPH Standard Method v1.1 or later.
 3. Components:
 - a. Field Finish: Three-coat low-VOC direct to metal acrylic painting system.

C 1030.002 Interior Overhead Coiling Doors

- A. Aluminum-Framed Sliding Doors:
 1. Description: Overhead coiling doors.
 2. Components:
 - a. Tracks: Manufacturer's standard
 - b. Finish: Factory finished, powder coat.

C 1030.003 Interior Access Doors and Panels

- A. Description: Galvanized steel, factory primed access doors and panels, field painted to match adjacent wall color.
- B. Functional Requirements:
 1. Sustainable Design Requirements:
 - a. Paints and Coatings: Comply with the following:
 - 1) VOC Content: Comply with limits in CARB 2007 SCM for Architectural Coatings, or SCAQMD Rule 1113.
 - 2) VOC Emissions Evaluation: Tested in accordance with CDPH Standard Method v1.1 or later.
- C. Components:
 1. Field Finish: Three-coat low-VOC direct to metal acrylic painting system.

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C 1040 Interior Grilles and Grates (Not Used)

C 1060 Raised Floor Construction (Not Used)

C 1070 Suspended Ceiling Construction

C 1070.001 Acoustical Suspended Ceilings

- A. Description: Acoustical panels and exposed suspension systems for ceilings.
- B. Components:
 - 1. Ceiling Panels: ASTM E 1264.
 - 2. Metal Suspension System: Heavy-duty, direct-hung metal suspension systems complying with ASTM C 635.

C 1090 Interior Specialties

- A. Interior Signage:
 - 1. Description:

C 1090.002 Compartments and Cubicles

- A. Toilet Compartments:
 - 1. Description: Floor mounted, overhead braced toilet partitions.
 - 2. Components:
 - a. Panels: High density polyethylene.

C 1090.003 Wall and Door Protection

- A. Corner Guards:
 - 1. Description: Stainless steel corner guards.
- B. Impact-Resistant Sheet Wall Protection:
 - 1. Description: Fiberglass Reinforced Plastic (FRP); Panolam FRP.

C 1090.004 Toilet, Bath, and Laundry Accessories

- A. Description: Stainless steel washroom accessories.

C 20 - INTERIOR FINISHES

C 2010 Wall Finishes

C 2010.001 Gypsum Board Finish

- A. Description: ASTM C 840 and as follows:

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PRELIMINARY PROJECT DESCRIPTION
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1. Level 1: Plenum areas above ceilings, concealed areas.
2. Level 4: Typical for exposed surfaces.
3. Level 5: Walls subject to bright artificial or natural lighting, surfaces scheduled for high-gloss paint finishes, lobbies, and double-height spaces.

C 2010.002 Wall Painting and Coating

- A. Description: Three-coat low-VOC acrylic latex painting system.

C 2010.003 Wall Paneling

- A. Wood Wall Paneling:
1. Description: Wood veneer-faced wall paneling with transparent finish.
 2. Functional Requirements: Complying with AWS, premium grade.
 3. Components:
 - a. Perforated, decorative aluminum panels.
 - b. Wood Veneer: Transparent finished wood species.
 - c. Transparent Finish: AWS System 5, Conversion varnish or AWS System 11, Catalyzed polyurethane.

C 2010.004 Sound-Absorbing Wall Units

- A. Description: .
1. RPG Acoustical Systems Omnifusor W113 at walls (wood veneer).
 2. RPG Acoustical Systems Omnifusor W113 at ceilings (plastic laminate).

C 2010.005 Tackable Wall Panels

- A. Description: Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
1. Acceptable Products: Subject to compliance with requirements, provide Claridge Arise Marker Wall or G&S Acoustics Tackable Wall Panels (TW).
 2. Vinyl Wall Covering: As selected by Architect.

C 2010.006 Special Wall Surfacing

- A. Fabric-Wrapped Panels
1. Description: Shop-fabricated, fabric-wrapped, decorative or tackable panels attached to walls; Conwed Respond A Series.
 2. Components:
 - a. Core.
 - b. Facing Material.
- B. Fiber Reinforced Plastic Panels (FRP):
1. Description: Nudo FRP at Kitchen.

LODI MIDDLE SCHOOL ADDITIONS
LODI, CALIFORNIA
PRELIMINARY PROJECT DESCRIPTION
14 AUGUST 2024

C 2020 Interior Fabrications (Not Used)

C 2030 Flooring

C 2030.001 General

- A. Performance Requirements:
 - 1. Slip Resistance, Coefficient of Friction: Provide flooring with the following values as determined by testing identical products in accordance with the following:
 - a. Level Surfaces, Dry and Wet: DCOF of not less than 0.42 in accordance with ANSI A326.3.

C 2030.002 Concrete Sealer

- A. Description: Liquid chemical hardener.

C 2030.003 Resilient Flooring

- A. Solid Vinyl Tile:
 - 1. Description: Floor tiles composed of vinyl binder, fillers and pigments according to ASTM F 1700.
- B. Resilient Athletic Flooring:
 - 1. Description: Rubber athletic flooring provided as rolled goods for adhered installation
- C. Resinous Flooring:
 - 1. Description: Abrasion-, impact-, and chemical-resistant, aggregate-filled, and resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.
 - 2. Body and Top Coats:
 - a. Resin: Epoxy.

C 2030.004 Resilient Base and Accessories

- A. Description: Resilient base and accessories for installation with resilient floor coverings, carpet, and carpet tile.
- B. Components:
 - 1. Base: Straight, cove, butt to, or sculptured style.
 - 2. Accessories: Nosings, edges, caps, reducer strips, joiners, and transition strips.

C 2030.005 Carpeting

- A. Description: Tile carpeting.
- B. Functional Requirements:
 - 1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
 - 2. Optical Smoke Density Rating: Does not exceed 450 according to ASTM E662.

LODI MIDDLE SCHOOL ADDITIONS
LODI, CALIFORNIA
PRELIMINARY PROJECT DESCRIPTION
14 AUGUST 2024

C 2030.006 Entrance Floor Mats

- A. Description: Surface applied floor mats.
- B. Components:
 - 1. Carpet tile.

C 2040 Stair Finishes: Not Used

C 2050 Ceiling Finishes

C 2050.001 Gypsum Board Finish

- A. Description: Finishes for gypsum board ceiling assemblies
- B. Functional Requirements: ASTM C 840 and as follows:
 - 1. Level 4: Typical for exposed surfaces.
 - 2. Level 5: Surfaces subject to bright artificial or natural lighting.

C 2050.002 Ceiling Painting and Coating

- A. Description: Three-coat low-VOC acrylic latex painting system.

C 2050.003 Acoustical Ceiling Treatment

- A. Description: Shop-fabricated, fabric-wrapped, sound absorbing, reflecting, and diffusing ceiling units tested for acoustical performance.

END OF ELEMENT

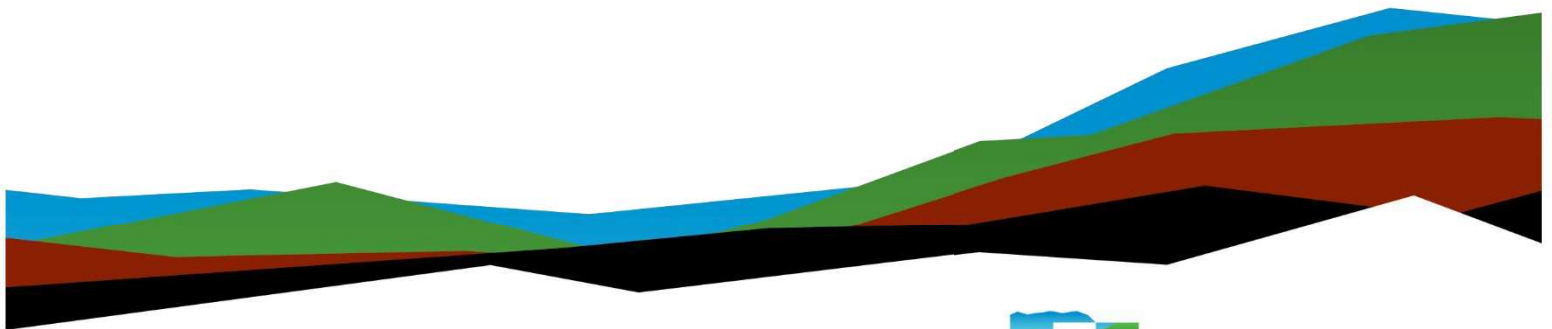
Lodi Middle School Additions

Geotechnical Engineering Report

August 23, 2024 | Terracon Project No. NA245056

Prepared for:

Lodi Unified School District
1305 E. Vine Street
Lodi, CA 95240



Nationwide
Terracon.com

- Facilities
- Environmental
- Geotechnical
- Materials



902 Industrial Way
Lodi, CA 92540
P (209) 367-3701
Terracon.com

August 23, 2024

Lodi Unified School District
1305 E. Vine Street
Lodi, CA 95240

Attn: Edith Holbert
P: (209) 331-7121
E: eholbert@lodiUSD.net

Re: Geotechnical Engineering and Geologic Hazards Report
Lodi Middle School Additions
945 S Ham Ln.
Lodi, San Joaquin County, California
Terracon Project No. NA245056

Dear Ms. Holbert:

We have completed the scope of Geotechnical Engineering services for the referenced project in general accordance with Terracon Proposal No. PNA245056 dated June 24, 2024. This report presents the findings of subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs, and pavement for the proposed project as well as a study of geologic hazards.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon



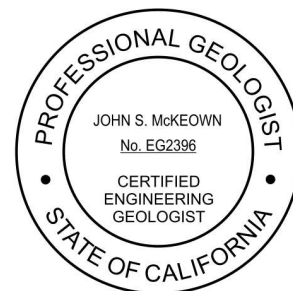
Senior Staff Engineer

Yuchen Huang



Garret S.H. Hubbart
GE 2588
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John S. McKeown
CEG 2396
Senior Geologist

John S. McKeown

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Attachments

- Exploration and Testing Procedures**
- Site Location and Exploration Plans**
- Exploration and Laboratory Results**
- Supporting Information**

Note: This report was originally delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the  logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

Refer to each individual Attachment for a listing of contents.

Report Summary

Topic ¹	Overview Statement ²
Project Description	The project includes a new multi-purpose/gym building, modular classrooms, and pavements.
Geotechnical Characterization	Near surface soils generally consist of loose to very dense sands with varying amounts of silt or clay overlain by interbedded layers of silty and clayey soils. Groundwater was observed in boring B0 during our exploration at approximately 50 feet below ground surface.
Earthwork	Cuts and fills on the order of 2 feet or less are anticipated to be required to develop final grades. Onsite sands, clayey sands and silty sands may be used as structural fill. Grading should be conducted in accordance with the Earthwork section of this report.
Shallow Foundations	Shallow foundations are recommended for metal shade structure, classrooms and multi-purpose buildings support. Allowable bearing pressure = 3,000 psf Expected settlements: < 1-inch total, < ½-inch differential
Pavements	See the Pavements section for pavement recommendations.
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics in the table can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.



Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed Lodi Middle School Additions project to be located at 945 S Ham Ln. in Lodi, San Joaquin County, California. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Seismic site classification per the 2022 California Building Code (CBC)
- Liquefaction analysis
- Site preparation and earthwork
- Foundation design and construction
- Floor slab design and construction
- Pavement design and construction

The geotechnical engineering Scope of Services for this project included the advancement of test borings/CPTs, laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and boring/CPT locations are shown on the [Site Location](#) and [Exploration Plan](#), respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the [Exploration Results](#) section.

Project Description

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An email request for proposal was provided by Jennifer Huang with HMC Architects on April 10, 2024. The request included a description of the requested scope and a conceptual site plan of the planned development. A subsequent email from Jennifer Huang on June 21, 2024, included a 50% design development overall site plan.
Project Description	The project includes a new multi-purpose/gym building, modular classrooms, and pavements.

Geotechnical Engineering Report

Lodi Middle School Additions | Lodi, San Joaquin County, California
 August 23, 2024 | Terracon Project No. NA245056



Item	Description
Proposed Structure	Structures associated with the project include an 10,696 square foot multipurpose building, 2 classroom buildings totaling 12,522 square feet, and a 30' x 64' metal shade structure.
Building Construction	We anticipate construction may consist of single story, slab on grade, steel, or wood framed structures.
Finished Floor Elevation	Not provided; boring/CPT depths have assumed the finished floor is not more than 2 feet below/above existing grade
Maximum Loads	Anticipated structural loads were not provided. In the absence of information provided by the design team, we have used the following loads in estimating settlement based on our experience with similar projects. ■ Columns: 30 to 70 kips ■ Walls: 1 to 4 kips per linear foot (klf) ■ Slabs: 150 pounds per square foot (psf)
Grading	A preliminary grading plan was not available for review at the time this report was prepared. Approximately 2 feet of cut and 2 feet of fill will likely be required to develop final grade, excluding remedial grading requirements.
Pavements	Paved driveway and parking will be constructed on the parcel. Asphalt and Concrete surfacing are common in the area for projects of this nature and is the assumed preference. The anticipated ACI traffic categories and daily truck traffic were assumed to consist of: ■ Category A: Car parking areas and access lanes, 1 truck per day ■ Category B: Entrance and truck service lanes, 10 trucks per day ■ Category C: Buses ■ Category E: Garbage or fire truck lanes The following traffic indices (TIs) were used: ■ Playground: TI = 4.5 ■ Auto Parking Areas: TI = 5.0 ■ Auto Road: TI = 5.5 ■ Truck Parking Areas: TI = 6.0 ■ Truck Ramps and Roads: TI = 7.0 The pavement design period is 20 years.
Building Code	2022 California Building Code (CBC)

Terracon should be notified if any of this information is inconsistent with the planned construction, especially the grading limits, as modifications to our recommendations may be necessary.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at 945 S Ham Ln. in Lodi, San Joaquin County, California. APN: 031-04-002 Latitude/Longitude (approximate): 38.1215° N, 121.2890° W See Site Location
Existing Improvements	The site is developed with an existing middle school.
Current Ground Cover	The current ground cover consists of asphalt pavement and landscaped lawn.
Existing Topography	The property is relatively flat based on a review of Google Earth. Boring/CPT depths have been estimated in part with this information.

Geotechnical Characterization

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting, and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the [Exploration Results](#) and the GeoModel can be found in the [Figures](#) attachment of this report.

As part of our analyses, we identified the following general model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.



Model Layer	Layer Name	General Description
1	Sand	Loose to very dense, fine to coarse grained to poorly graded sand with various amounts of silt or clay
2	Silt	Stiff silt
3	Clay	Very stiff to hard, lean clay with various amounts of sand

Practical refusal was encountered in CPT-01 at a depth of 16.9 feet below ground surface (bgs). In an effort to advance the CPT sounding at the location, we moved off the location several feet to re-attempt the advancement of CPT-01. CPT-01A also encountered practical refusal at a depth of 12.7 feet bgs. CPT-02 also experienced refusal at a depth of 10.6 feet bgs. Refusal is defined as the depth below the ground surface at which a CPT can no longer be advanced.

Groundwater Conditions

Groundwater was encountered in boring B0 at a depth of approximately 50 feet bgs. Groundwater level contour mapping shows the groundwater depth was measured to be approximately 60 feet bgs in Spring 2023¹.

Nearby monitoring wells measured by the California Department of Water Resources were researched for groundwater levels from 1991 to 2024 and summarized in the following table.

¹ California Department of Water Resources (DWR); "SGMA Data Viewer"; <https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels>

State/Local Well Number	Well Coordinates (NAD83)	Approximate Distance to the project location	Ground Surface Elevation (NAVD88 ft)	Highest Groundwater Measurement Elevation (feet)	Depth to Highest Groundwater (feet)
Lodi MW-16	38.1211°N, 121.2856°W	1,000 feet	39.19	-7.03	46.22
Lodi WMW-2A	38.1164°N, 121.2792°W	3,300 feet	41.78	-12.82	54.6
Lodi WMW-1A	38.1203°N, 121.2787°W	3,000 feet	42.19	-10.02	52.21
Lodi MW-11	38.1287°N, 121.2851°W	2,800 feet	41.11	0.33	40.78
03N06E1 5C004M	38.1153°N, 121.3085°W	1.1 miles	33.42	-7.08	40.5
03N06E1 0D001M	38.1298°N, 121.3119°W	1.3 miles	37.04	1.04	36

From our review, the highest historical groundwater within about a 1-mile radius is 36 feet. Groundwater conditions may change because of seasonal variations in rainfall, runoff, and other conditions not apparent at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Geologic Hazards

The site is located within the San Joaquin Valley – the southern part of the Great Valley Geomorphic Province. The Great Valley is an alluvial plain that lies within central California and is separated along the Stockton Arch into northern and southern basins. The Great Valley is a trough into which sediments have been deposited since the Jurassic time period. The geology of the site is mapped as Pleistocene age Modesto Formation (Qm²) which is composed chiefly of eolian and fluvial sands, gravels, and clays. A [Geologic Map](#) based on Dawson (2009) is attached.

Faulting and Seismicity

The tectonics of the central California area are dominated by the interaction of the North American and Pacific tectonic plates, which are sliding past each other in transform motion. The San Andreas fault zone represents the major surface expression of the tectonic boundary and accommodates a significant portion of the slip between the Pacific and North American plates. Some of the slip is accommodated by other northwest-trending strike-slip faults that are related to the San Andreas system, such as the Concord-Green Valley fault and Hayward fault. The Great Valley thrust fault system marks a boundary between the Coast Ranges and Central Valley of California. A **Regional Faults** map is attached.

The Stockton fault is a basin structure associated with the Stockton Arch, an ancient antiform at the north end of the San Joaquin structural basin (Bartow, 1991). This fault is buried beneath the alluvium and sediments of the valley approximately 25 kilometers south of the site and is considered inactive for planning purposes.

Fault Rupture Potential: The site is not located within an Alquist-Priolo Earthquake Fault Zone (APZ) designated by the State of California for active faults (Bryant and Hart, 2007). The closest APZ boundary, designated for the Greenville fault, is located approximately 34 miles (55 kilometers) southwest of the site. Known faults or fault-related features are not located within the site; therefore, the potential for fault rupture within the site is considered low.

The following table summarizes mapped faults in the site region.

Fault	Distance (km)	Direction	Magnitude ¹	Type
Great Valley 7 - Midland	31	W	7.12	reverse
Foothills Fault System (Ione)	40	NE	6.5 ²	--
Foothill Fault System (Waters Peak)	41	NE	6.5 ²	--
Vaca	48	W	6.6	Strike slip
Great Valley 7 - Orestimba	52	SW	6.9	reverse
Great Valley 5 – Pittsburg-Kirby Hills	53	W	6.6	reverse
Greenville	56	SW	6.9	Strike slip
Great Valley 4 – Gordon Valley	61	NW	6.77	reverse
Mount Diablo Thrust	67	SW	6.72	thrust
Concord	67	WSW	6.45	Strike slip
Green Valley	71	W	6.3	Strike slip
Calaveras	71	SW	6.86	Strike slip
Cordelia	74	W	6.3	Strike slip

Fault	Distance (km)	Direction	Magnitude ¹	Type
West Napa	84	W	6.97	Strike slip
Hayward	85	SW	7.58	Strike slip
San Andreas	116	SW	8.04	Strike slip

Historical Seismicity

The following table summarizes significant seismic events in the site region.

Date	Distance from Site (km)	Direction	Magnitude
05-19-1889	45	W	6.0
07-15-1866	50	SW	6.0
01-27-1980	55	SW	5.4
04-21-1892	68	NW	6.4
04-19-1892	69	NW	6.6
03-05-1864	80	SW	6.0
11-26-1858	82	SW	6.2
08-24-2014	90	WNW	6.0
04-10-1881	91	S	6.3
08-06-1979	115	SW	4.3
10-08-1865	116	SW	6.5
06-25-1838	118	SW	7.4
04-18-1906	118	WSW	7.9
10-15-2019	164	S	4.5

A search of the USGS earthquake catalog (USGS, 2024a) for earthquakes of magnitude 4.5 or greater within 150 kilometers of the site returned 230 results including 2 events of magnitude 7 or greater, 30 events of magnitude 6 to 7, 71 events of magnitude 5 to 6, and 126 events of magnitude 4.5 to 5. A [Regional Seismicity](#) map based on these data is attached.

Based on the seismic setting and history of the greater Bay Area and Great Valley regions, a potential exists for moderate to strong ground shaking to occur within the lifetime of the proposed project. Seismic shaking hazard can be addressed by application of building code provisions that consider building use and type, geographic location, site geologic conditions, and distance to seismic sources.

Slope Stability and Lateral Spreading

The California Geological Survey (CGS) has designated certain areas within California as potential seismically induced landslide hazard zones. These are areas considered at risk of slope failure during a seismic event, based upon mapped surficial deposits and ground-shaking potential. The project area has not been evaluated by CGS for seismically induced landslide hazard zoning.

The site is situated in a relatively planar area of low relief. Slopes or natural features conducive to slope instability are not located in the project area. The potential for landslide or lateral spreading is very low. The potential for earthquake-induced landsliding is also very low.

Flooding

Based on a review of the Federal Emergency Management Agency (FEMA) National Flood Layer (NFHL), the project site is in an area with a FEMA Flood Zone X designation specified as an area of minimal flood hazard.

Dam inundation from reservoirs impounded by dams in the Sierra Nevada east of the site, including Camanche, Camanche South and North Dikes, and Pardee may pose a threat to the Lodi area (Lodi General Plan 2010). These dams are monitored by State and/or Federal agencies for seismic safety.

The site is not within a coastal area or within ¼ mile of a large open water body; therefore, no potential for tsunami or seiche exists at the site.

Subsidence

Subsidence due to fluid withdrawal (groundwater, oil, gas) or peat oxidation is not documented in the site area (USGS, 2024b, 2018a, 2018b). The potential for subsidence to affect the proposed project is low.

Oil and Gas Exploration

According to available mapping by the California Division of Oil, Gas and Geothermal Resources, the subject property is not located within, or near, any gas or oil production area (see [Oil and Gas Map](#)). One plugged and abandoned gas well is mapped approximately 1 mile from the sites (CalGEM, 2024). We do not consider oil- or gas-related hazards to be potential hazards at the site.

Additional Hazards

Radon is a naturally occurring, colorless and tasteless gas produced in soil or rock by the decay of uranium and radium; radon is a known cause of lung cancer in the United States. Sections 307 and 309 of the Indoor Radon Abatement Act of 1988 (IRAA) directed EPA to list and identify areas of the U.S. with the potential for elevated indoor radon levels. EPA's Map of Radon Zones (EPA, 2019) assigns each of the 3,141 counties in the U.S. to one of three zones based on radon potential. San Joaquin County and the project site are located in Zone 3 for radon potential. Zone 3 counties have a predicted average indoor radon screening level of less than 2 pCi/L and are anticipated to have a low potential for radon.

The site is not within an area indicated by the State of California as having a potential for indoor radon (CGS, 2023).

The site is not within an area indicated as having a potential for asbestos minerals (CGS, 2000).

Liquefaction

Liquefaction is a mode of ground failure that results from the generation of high pore water pressures during earthquake ground shaking, causing loss of shear strength. Liquefaction is typically a hazard where loose sandy soils or low plasticity fine grained soils exist below groundwater. The California Geological Survey (CGS) has designated certain areas within California as potential liquefaction hazard zones. These are areas considered at risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table. The project site has not been evaluated by the CGS for liquefaction hazards. Due to the depth of historical groundwater, less than 50 feet bgs, and as required by CGS, a **Liquefaction Analysis** for the site has been performed and is included within this report.

Seismic Considerations

The Sacramento Valley of California is a relatively moderate seismicity region. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. The following information is based on the 2018 USGS seismic model, as calculated using the USGS Earthquake Hazard Toolbox. Fault sources that contribute to the seismic hazard for the site include the Greenville, San Andreas, Great Valley and Hayward, with disaggregated model distances of approximately 55 kilometers, 115 kilometers, 34 kilometers, and 83 kilometers, respectively. Non-fault 'gridded' or background seismic sources are considered to have the most significant effect at the site from a design standpoint. A

mean earthquake magnitude of 6.3 and modal magnitude of 5.5 may be considered for this site based on the USGS disaggregation.

Based on the ASCE 7-16 Standard, the site-modified design peak ground acceleration ($PGAM$) at the subject site is 0.352g. Based on the USGS 2018 interactive disaggregation, the PGA at the subject site for a 2% probability of exceedance in 50 years (return period of 2475 years) is calculated as 0.37g.

The 2022 California Building Code (CBC) Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool. This web-based software application calculates seismic design parameters in accordance with ASCE 7-16, and 2022 CBC. The 2022 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_s value greater than or equal 0.2. Therefore, the project is subject to a requirement for site-specific ground motion hazard analysis in accordance with ASCE 7, 21.2. An exception to this requirement is included in Supplement 3 to ASCE 7 that states: "A ground motion hazard analysis is not required 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 the Standard."

Based on this exception, the spectral response accelerations presented in the following table were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2022 CBC.

Description	Value
2022 California Building Code (CBC) Site Classification ¹	D ²
Risk Category	IV
Site Latitude ³	38.1215°N
Site Longitude ³	121.2890°W
S_s , Spectral Acceleration for a Short Period ⁴	0.628
S_1 , Spectral Acceleration for a 1-Second Period ⁴	0.261
F_a , Site Coefficient	1.298
F_v , Site Coefficient (1-Second Period)	2.08
S_{Ds} , Spectral Acceleration for a Short Period	0.543
S_{D1} , Spectral Acceleration for a 1-Second Period	0.542

Description	Value
1. Seismic site soil classification in general accordance with the 2022 <i>California Building Code</i>, which refers to ASCE 7-16. Site Classification is required to determine the Seismic Design Category for a structure. 2. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7-16 and the 2022 CBC. Subsurface explorations at this site were extended to a maximum depth of approximately 51½ feet bgs. The site properties below the maximum exploration depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper exploration or geophysical testing may be performed to confirm the conditions below the current maximum depth of exploration. 3. Provided coordinates represent a point located at the general center of the site. 4. These values were obtained using online seismic design maps and tools provided by the ASCE 7 Hazard Tool (https://asce7hazardtool.online).	

Typically, a site-specific ground motion study may reduce construction costs. We recommend consulting with a structural engineer to evaluate the need for such a study and its potential impact on construction costs. Terracon should be contacted if a site-specific ground motion study is desired.

Liquefaction Analysis

We performed a liquefaction hazard evaluation in general compliance with the California Geological Survey (CGS) Special Publication 117A (2008) and the Southern California Earthquake Center "Recommended Procedures for Implementation of DMG Special Publication 117 Guidelines for Analyzing and Mitigating Liquefaction Hazards in California," 1999 report.

As recommended in these reports, we performed a screening analysis to determine if there is a potential for liquefaction to occur at the site. We evaluated the soils encountered in our borings advanced to a maximum depth of 51½ feet below the existing ground surface (bgs). We evaluated these soils based on soil classification, corrected SPT blow counts, water content, Atterberg limits, groundwater elevation, shear strength, and peak ground acceleration. Based on our review of this data, it is our opinion that all soils within the upper 50 feet of the soil profile do have the potential for liquefaction. As a result, we performed a quantitative evaluation of the potential for liquefaction to occur considering all soils and the effects if liquefaction were to occur on this project. We also considered the potential for settlement of unsaturated sands following a design seismic event.

A modified Peak Ground Acceleration (PGA_M) of 0.352g and a mean earthquake magnitude of 6.5 for the project site were used in our evaluation. Groundwater was encountered in Boring B0 at a depth of 50 feet bgs at the time of our exploration. However, the historical depth to highest groundwater in a nearby well (about 1 mile from the site) was 36 feet bgs. As a result, a groundwater depth of 36 feet was utilized in our evaluation.

The liquefaction study and analysis of seismic settlement of unsaturated sands utilized the software "LiquefyPro" by CivilTech Software. An analysis was performed on data obtained from Boring B0 as well as the upper loose sands from Boring B5 and B6. Fines corrections were made using the Modify Stark/Olson method. The settlement analysis used the Ishihara/Yoshimine method. A factor of safety of 1.3 was used against liquefaction. The liquefaction potential analysis was calculated from a depth of 36 feet to 51½ feet bgs and the settlement of unsaturated sands was considered from the ground surface to a depth of 36 feet bgs. A summary of the results of our analysis has been attached to this report.

The soil layer most susceptible to the potential of liquefaction is located between 35 feet and 49 feet bgs, however this layer still had a relatively high safety factor against liquefaction. Based on our review of the calculations, the anticipated potential total and differential settlement due to liquefaction and seismic settlement of unsaturated sands is relatively negligible, less than 1/8 of an inch. Hence, we believe the probability for liquefaction to manifest at the surface is also very low.

With regards to the potential for lateral spreading, we note that the site and surrounding area is relatively level. Therefore, the probability for lateral spreading is also very low.

Corrosivity

The following table lists the results of laboratory soluble sulfate, soluble chloride, electrical resistivity, and pH testing. The values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Corrosivity Test Results Summary

Boring	Sample Depth (feet)	Soil Description	Soluble Sulfate (%)	Soluble Chloride (%)	Electrical Resistivity (Ω -cm)	pH
B0	1	Silty Sand	0.003	0.002	5,300	8.26
B3	1	Clayey Sand	0.007	0.001	59,000	8.22

Results of soluble sulfate testing can be classified in accordance with ACI 318 – Building Code Requirements for Structural Concrete. Numerous sources are available to characterize corrosion potential to buried metals using the parameters presented in the previous table. ANSI/AWWA is commonly used for ductile iron, while threshold values for evaluating the effect on steel can be specific to the buried feature (e.g., piling, culverts, welded wire reinforcement, etc.) or agency for which the work is performed. Imported fill materials may have significantly different properties than the site materials noted in the table and should be evaluated if expected to be in contact with metals used for construction. Consultation with a NACE certified corrosion professional is recommended for buried metals on the site.

Geotechnical Overview

The subject site has geotechnical considerations that will affect the construction and performance of the proposed improvements that are discussed in this report. The primary geotechnical consideration that has been identified at the subject site that will affect development is the following:

- Loose/Unstable subgrade potential

Loose/Unstable Subgrade Potential

Loose sandy soil was noted near the surface in our soil borings (B5 and B6, from 0 to 6½ feet). These soils may become unstable when disturbed. During periods of dry weather, these soils may be stable upon initial exposure, however, these soils could become relatively unstable under construction traffic. Furthermore, depending upon site conditions during construction, over-excavation, or stabilization of the subgrade and/or base of over-excavations may be needed to achieve a suitable working surface. Accordingly, we recommend that the owner budget for the possibility that over-excavation and/or stabilization may be required, and contractors be prepared to handle potentially unstable conditions. Stabilization may consist of aerating/drying the soil or a composite section of aggregate base and geogrid.

Earthwork

We anticipate grading will consist of cuts and fills on the order of 2 feet or less and that site grades will generally remain at the same elevation as existing. Specific site grading information was unavailable at the time this report was prepared. If elevation and site grading differ from our stated assumptions, Terracon should be contacted to determine if additional earthwork recommendations are warranted.

Earthwork is anticipated to include clearing and grubbing, excavations, and engineered fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations and floor slabs.

Demolition

The proposed classroom buildings will be constructed within the footprint of existing buildings which will need to be demolished or removed, along with exterior sidewalks, pavements, and utilities. We recommend existing foundations, slabs, and utilities be removed from within the proposed building footprint and at least 5 feet beyond the outer edge of foundations. This should include removal of any loose backfill found adjacent to existing foundations. If pipes are abandoned in-place, they should be filled completely with lean cement grout, or other suitable material, to avoid collapse in the future. All materials derived from the demolition of existing structures and pavements should be removed from the site and not be allowed for use as on-site fill, unless processed in accordance with the fill requirements included in this report.

For areas outside the proposed building footprints and foundation bearing zones, existing foundations, floor slabs, and utilities should be removed where they conflict with proposed utilities and pavements. In such cases, existing foundations, floor slabs, and utilities should be removed to a depth of at least 2 feet below the affected utility or design pavement subgrade elevation.

Site Preparation

Prior to placing fill, existing landscape/vegetation, topsoil, and root mats should be removed. Complete stripping of the topsoil should be performed in the proposed areas. Stripping should extend laterally a minimum of 5 feet beyond the limits of proposed improvements. The native sandy materials which contain less than 3 percent organics can be reused as engineered fill provided the material meets the specifications for general or structural fill and is moisture conditioned and properly compacted.

Although no evidence of fill or underground facilities (such as septic tanks, cesspools, basements, and utilities) was observed during the exploration and site reconnaissance, such features could be encountered during construction. If unexpected fills or underground facilities are encountered, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Subgrade Preparation

After clearing, any required cuts and over-excavation should be made.

We recommend that the soils within the footprint of the proposed metal shade structure (at boring B5) be removed to a minimum depth of 2½ feet below the bottom of footings, or 4 feet below existing grades, whichever is deeper. In lieu of over excavating the entire footprint, the foundation may be supported on a minimum of 2½ feet of engineered fill or recompacted native sandy soil. Structural fill placed beneath the entire footprint of the foundations should extend horizontally a minimum distance of 5 feet beyond the outside edge of footings. On-site near surface soils are considered suitable to be used as structural fill materials.

The soils within the footprint of the proposed classrooms, multi-purpose building, and as well as any exterior slabs and pavements should be scarified a minimum of 12 inches and recompacted.

Excavated material may be stockpiled for use as fill provided it is cleaned of organic material (less than 3 percent by dry unit weight), debris, and any other deleterious material and meets the criteria for general or structural fill specified in the **Fill Material Types** section of this report.

Once cuts and over-excavation operations are complete, the resulting subgrade should be proofrolled with an adequately loaded vehicle such as a fully loaded tandem-axle dump truck. The proofrolling should be performed under the observation of the Geotechnical Engineer or their representative. Areas excessively deflecting under the proofroll should be delineated and subsequently addressed by the Geotechnical Engineer. Such areas should either be removed or modified by stabilizing as noted in the **Soil Stabilization** section. Excessively wet or dry material should either be removed, or moisture conditioned and recompacted.

Once proof rolling has been performed, all exposed areas which will receive fill, once properly cleared, should be scarified, moisture conditioned as necessary, and compacted per the compaction requirements in this report. A representative from Terracon should be present to observe the exposed subgrade and specify the depth of scarification and moisture conditioning required after grading cuts and prior to placing fill.

Following scarification, moisture conditioning, and compaction of the subgrade soils, compacted structural fill soil should then be placed to the proposed design grade and the moisture content and compaction of subgrade soils should be maintained until foundation construction.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable; however, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved per the recommendations provided in the **Soil Stabilization** section of this report.

Excavation

We anticipate that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. Some cemented soils were encountered in our exploratory borings, so extra time may be required for excavation in these soils. The contractors shall plan their work accordingly. The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

Individual contractors are responsible for designing and constructing stable, temporary excavations. Excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards.

Soil Stabilization

Methods of subgrade improvement, as described below, could include scarification, moisture conditioning and recompaction, and removal of unstable materials and replacement with granular fill (with or without geosynthetics). The appropriate method of improvement, if required, would be dependent on factors such as schedule, weather, the size of area to be stabilized, and the nature of the instability. More detailed recommendations can be provided during construction as the need for subgrade stabilization occurs. Performing site grading operations during warm seasons and dry periods would help reduce the amount of subgrade stabilization required.

If the exposed subgrade is unstable during proofrolling operations, it could be stabilized using one of the methods outlined below.

- **Scarification and Recompaction** - It may be feasible to scarify, dry, and recompact the exposed soils. The success of this procedure would depend primarily upon favorable weather and sufficient time to dry the soils. Stable subgrades likely would not be achievable if the thickness of the unstable soil is greater than about 1 foot or if construction is performed during a period of wet or cool weather when drying is difficult.
- **Aggregate Base** - The use of Caltrans Class II aggregate base is a common procedure to improve subgrade stability. Typical undercut depths would be expected to range from about 6 to 12 inches below finished subgrade elevation. The use of high modulus geosynthetics (i.e., engineering fabric or geogrid) could also be considered after underground work such as utility construction is completed. Prior to placing the fabric or geogrid, we recommend that all below grade construction, such as utility line installation, be completed to avoid damaging the fabric or geogrid. Equipment should not be operated above the fabric or geogrid until one full lift of aggregate base is placed above it. The

maximum particle size of granular material placed over geotextile fabric or geogrid should meet the manufacturer’s specifications.

Further evaluation of the need and recommendations for subgrade stabilization can be provided during construction as the geotechnical conditions are exposed.

Fill Material Types

The fill required to achieve design grade should be classified as structural fill and general fill. Structural fill is material used below, or within 10 feet of structures. General fill is material used to achieve grade outside of these areas.

Reuse of On-Site Soil: Excavated on-site soil may be selectively reused as fill. Material property requirements for on-site soil for use as general fill and structural fill are noted in the following table:

Property	Structural Fill	General Fill
Composition	Free of deleterious material	Free of deleterious material
Maximum particle size	3 inches	6 inches (or 2/3 of the lift thickness)
Fines content	Less than 45% Passing No. 200 sieve	Not limited
Plasticity	Maximum liquid limit of 30 Maximum plasticity index of 10 Expansion index less than 20	Not limited
GeoModel Layer Expected to be Suitable ¹	1	1, 2, 3

1. Based on subsurface exploration. Actual material suitability should be determined in the field at time of construction.

Imported Fill Materials: Imported fill materials should meet the following material property requirements. Regardless of its source, compacted fill should consist of approved materials that are free of organic matter and debris. For all import material, the contractor shall submit current verified reports from a recognized analytical laboratory indicating that the import has a “not applicable” (Class S0) potential for sulfate attack based upon current ACI criteria and is “mildly corrosive” to ferrous metal and copper. The reports shall be accompanied by a written statement from the contractor that the laboratory test results are representative of all import material that will be brought to the project.

Soil Type ¹	USCS Classification	Acceptable Parameters (for Structural Fill)
Granular ²	GW, GM, SW, SM	Less than 45% passing No. 200 sieve

1. Structural and general fill should consist of approved materials free of organic matter and debris and should contain no material larger than 3 inches and 6 inches in greatest dimension, respectively. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation at least two weeks prior to use on this site. Additional geotechnical consultation should be provided prior to use of uniformly graded gravel on the site.
2. Caltrans Class II aggregate base may be used for this material. Recycled aggregate base should not be used without prior approval by the Geotechnical Engineer.

Fill Placement and Compaction Requirements

Compacted native soil and structural and general fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e., jumping jack or plate compactor) is used	Same as structural fill
Minimum Compaction Requirements ^{1,2}	95% of max. for aggregate base, and for fills deeper than 5 feet, and pavement 90% of max. for all other locations	90% of max.
Water Content Range ¹	Granular: -2% to +2% of optimum Low/medium plasticity: 2 to 4% of optimum	As required to achieve min. compaction requirements

1. Maximum density and optimum water content as determined by the Modified Proctor test (ASTM D 1557).
2. If the granular material is a coarse sand or gravel, or of a uniform size, or has a low fines content, compaction comparison to relative density may be more appropriate. In this case, granular materials should be compacted to at least 70% relative density (ASTM D 4253 and D 4254). Materials not amenable to density testing should be placed and compacted to a stable condition observed full time by the Geotechnical Engineer or representative.

Utility Trench Backfill

Any soft or unsuitable materials encountered at the bottom of utility trench excavations should be removed and replaced with structural fill or bedding material in accordance with public works specifications for the utility to be supported. This recommendation is particularly applicable to utility work requiring grade control and/or in areas where subsequent grade raising could cause settlement in the subgrade supporting the utility. Trench excavation should not be conducted below a downward 1:1 projection from existing foundations without engineering review of shoring requirements and geotechnical observation during construction.

It is recommended utilities and piping be designed with flexible connections and/or other means to accommodate soil movement to preclude damage due to excessive settlement from loose sandy soils. Utility and drain lines designed for gravity flow should consider steeper gradients to account for these settlements, especially where such lines enter the addition supported over soil mitigated by recompaction.

On-site materials are considered suitable for backfill of utility and pipe trenches from 1 foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances. Where trenches are placed beneath slabs or footings, the backfill should satisfy the gradation and Atterberg limit requirements of structural engineered fill discussed in this report.

Trench backfills should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Flooding or jetting for placement and compaction of backfill is not recommended.

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. Terracon also recommends that clean granular fill be tracked or tamped in place where possible to limit the amount of future densification which may cause localized settlements over time.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto pavements and/or are tied to tight lines that discharge into a storm drainage system.

Exposed ground should be sloped and maintained at a minimum of 5 percent away from the building for at least 10 feet beyond the perimeter of the building. If a minimum 5 percent slope cannot be achieved due to site grades, a minimum 2½ percent slope could be used provided pavement or hardscape surrounds and extends to the building, or a subdrain could be installed around the perimeter of the foundations that carries water away from the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted as necessary as part of the structure's maintenance program. Where paving or flatwork abuts the structure a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Any planters and/or bio-swales located within 10 feet of the building should be self-contained or lined with an impermeable membrane to prevent water from accessing subgrade soils below the building. Sprinkler mains and spray heads should be located a minimum of 10 feet away from the foundation lines.

No vegetation over six feet in height shall be planted within 20 feet of the building perimeter unless a root barrier is provided between the structure and tree to limit roots within 10 feet of building. Roots can draw additional moisture from the soils and cause excessive volume changes in the soil resulting in building movement.

Implementation of adequate drainage for this project can affect the surrounding developments. Consequently, in addition to designing and constructing drainage for this project, the effects of site drainage should be taken into consideration for the planned structures on this property, the undeveloped portions of this property, and surrounding sites. Extra care should be taken to ensure irrigation and drainage from adjacent areas do not drain onto the project site or saturate the construction area.

Earthwork Construction Considerations

Shallow excavations for the proposed improvements are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs, exterior hardscape, and pavements. Construction traffic over the completed subgrades should be avoided to the extent practical. The site should also be graded to prevent ponding surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade should become desiccated, saturated, or disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to construction.

We recommend that the earthwork portion of this project be completed during extended periods of dry weather if possible. If earthwork is completed during the wet season (typically November through April) it may be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork operations may require additional mitigation measures beyond that which would be expected during the drier summer and fall months. This could include ground stabilization, diversion of surface runoff around exposed soils and draining of ponded water on the site. Once subgrades are established, it may be necessary to protect the exposed subgrade soils from construction traffic.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations. Stockpiles of soil, construction materials, and construction equipment should not be placed near trenches or excavations. ***The Contractor is responsible for maintaining the stability of adjacent structures during construction.***

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

Excavations or other activities resulting in ground disturbance have the potential to affect adjoining properties and structures. Our scope of services does not include review of available final grading information or consider potential temporary grading performed by the contractor for potential effects such as ground movement beyond the project limits. A preconstruction/ precondition survey should be conducted to document nearby property/infrastructure prior to any site development activity. Excavation or ground disturbance activities adjacent or near property lines should be monitored or instrumented for potential ground movements that could negatively affect adjoining property and/or structures.

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, debris) as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 1,500 square feet of compacted fill in the building area and 3,000 square

feet in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 100 linear feet of compacted utility trench backfill a minimum of one test performed for every 12 vertical inches of compacted backfill. The frequency of the testing may be adjusted during construction under the direction of the geotechnical engineer.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Shallow Foundations

The proposed metal shade structure, classrooms and multi-purpose buildings may be supported by spread footings. If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing Pressure^{1, 2}	3,000 psf
Required Bearing Stratum³	■ For Classrooms and Multi-purpose building: Structural fill or recompacted native soil ■ For Metal Shade Structure: A minimum of 2½ feet of structural fill and/or recompacted native sandy soil
Minimum Foundation Dimensions	Per CBC 1809.7
Maximum Foundation Dimensions	Columns: 8 feet Continuous: 4 feet
Passive Resistance^{4, 8} (equivalent fluid pressures)	350 pcf
Sliding Resistance^{5, 8}	0.40
Minimum Embedment below Finished Subgrade⁶	18 inches
Estimated Total Settlement from Structural Loads²	Less than about 1 inch
Estimated Differential Settlement^{2, 7}	About ½ of total settlement

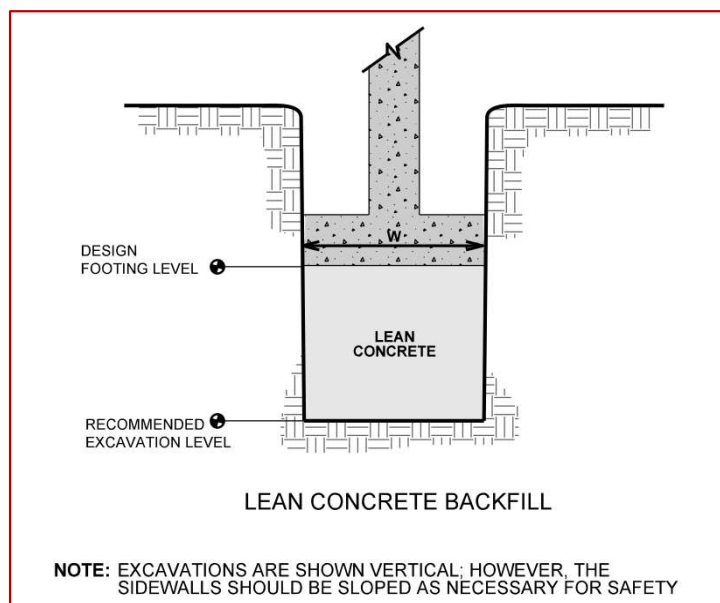
1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. This bearing pressure can be increased by 1/3 for transient loads unless those loads have been factored to account for transient conditions. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
2. Values provided are for maximum loads noted in [Project Description](#). Additional geotechnical consultation will be necessary if higher loads are anticipated.
3. Unsuitable or soft soils should be overexcavated and replaced per the recommendations presented in [Earthwork](#).
4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face. Assumes no hydrostatic pressure.

Item	Description
5.	Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Frictional resistance for granular materials is dependent on the bearing pressure which may vary due to load combinations.
6.	Embedment is necessary to minimize the effects of seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior subgrade within 5 horizontal feet of the structure.
7.	Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.
8.	Passive Resistance and Sliding Resistance may be combined to resist sliding provided the Passive Resistance is reduced by 50 percent.

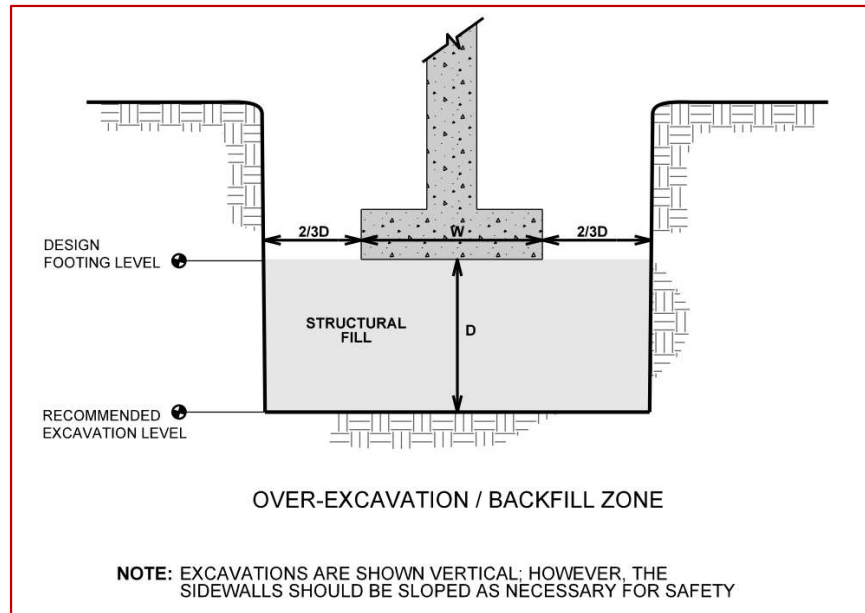
Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the observation of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

If unsuitable bearing soils are observed at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. The lean concrete replacement zone is illustrated in the following sketch.



Overexcavation for structural fill placement below footings should be conducted as shown in the following sketch. The overexcavation should be backfilled up to the footing base elevation, with structural fill placed, as recommended in the [Earthwork](#) section.



To ensure foundations have adequate support, special care should be taken when footings are located adjacent to trenches. The bottom of such footings should be at least 1 foot below an imaginary plane with an inclination of 1.5 horizontal to 1.0 vertical extending upward from the nearest edge of the adjacent trench.

Floor Slabs

Design parameters for floor slabs assume the requirements for [Earthwork](#) have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the floor slab support course beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support¹	■ Use 4 inches of ¾ inch free draining crushed rock³. ■ Subgrade compacted to the recommendations in Earthwork

Item	Description
Estimated Modulus of Subgrade Reaction ²	175 pounds per square inch per inch (psi/in) for point loads

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in [Earthwork](#), and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.
3. Free-draining granular material should have less than 5% fines (material passing the No. 200 sieve). Other design considerations such as cold temperatures and condensation development could warrant more extensive design provisions.

It is common to reduce the k-value to account for dimensional effects of large, loaded areas. For such features, the value of K_c in the following formula is the corrected or design modulus value in units of psi/in, k is the value provided in the previous table, and b is the mat width (short dimension) or tributary loaded area measured in units of feet. Soft or unstable subgrade will be remediated by scarifying and re-compacting or by over-excavation and replacement. For sand subgrades, this can be estimated as:

$$K_c = k \left(\frac{b + 1}{2b} \right)^2$$

Terracon can provide refined estimates of K_c if provided more detailed information regarding the loads and application area to conduct settlement analysis.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut contraction joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations, refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between

the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing, or other means.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

Exterior Hardscape

We recommend the subgrade soil below hardscapes be prepared in accordance with the Earthwork section above.

The following considerations should be given for the exterior hardscape, flatwork, and exterior architectural features.

- Slabs should be underlain by a minimum of 12 inches of compacted granular structural fill and/or recompacted native sandy soil. At the contractor's discretion, gravel may be placed between the slab and granular structural fill to assist with constructability.
- Minimizing moisture increases in the subgrade soils and backfill;
- Controlling moisture-density during placement of fill;
- Using designs which allow vertical movement between the exterior features and adjoining structural elements;
- Placing effective control joints in relatively close centers.
- Ensuring subgrade soils are in a moist condition prior to slab construction.
- Reinforcing exterior slabs and flatwork with a minimum No.4 bars at 18 inches on center.

Pavements

General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section.

On most project sites, the site grading is accomplished relatively early in the construction phase. Fills are placed and compacted in a uniform manner. However, as construction proceeds, excavations are made into these areas, rainfall and surface water saturates some areas, heavy traffic from concrete trucks and other delivery vehicles disturbs the subgrade and many surface irregularities are filled in with loose soils to improve trafficability temporarily. As a result, the pavement subgrades, initially prepared early in the project, should be carefully evaluated as the time for pavement construction approaches.

We recommend the moisture content and density of the top 12 inches of the subgrade be evaluated and the pavement subgrades be proofrolled within two days prior to commencement of actual paving operations. Areas not in compliance with the required ranges of moisture or density should be moisture conditioned and recompacted. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills.

If a significant precipitation event occurs after the evaluation or if the surface becomes disturbed, the subgrade should be reviewed by qualified personnel immediately prior to paving. The subgrade should be in its finished form at the time of the final review.

Pavement Design Parameters

Design of Asphaltic Concrete (AC) pavement sections were calculated using the Caltrans Highway Design Manual, latest edition, and a 20-year design life. Design of Portland Cement Concrete (PCC) pavement sections were designed using ACI 330R-21, "Guide for the Design and Construction of Concrete Parking Lots."

Bulk sample of the near surface native soils was collected to perform Hveem Stabilometer (R-Value) testing. Representative bulk sample from borings B4 and B5 was selected for testing. The testing resulted in an R-Value of 42. Subsequently, an R-Value of 42 was used for the subgrade for the asphaltic concrete (AC) pavement designs. A

modulus of subgrade reaction of 100 pci was used for the Portland cement concrete (PCC) pavement designs. The value was empirically derived based upon our experience with the silty sand subgrade soils and our expectation of the quality of the subgrade as prescribed by the **Site Preparation** conditions as outlined in **Earthwork**. A modulus of rupture of 550 psi was used in design for the concrete (based on correlations with a minimum 28-day compressive strength of 4,500 psi).

The recommendations are based on the subgrade being in a firm and unyielding condition.

Pavement Section Thicknesses

The following table provides our opinion of minimum thickness for AC sections:

Asphaltic Concrete Design

Layer	Thickness (inches)				
	Playground (TI=4.5) ¹	Auto Parking Areas (TI=5.0) ¹	Auto Road (TI=5.5) ¹	Truck Parking Areas (TI=6.0) ¹	Truck Ramps and Roads (TI=7.0) ¹
AC ^{2, 3}	2.5	3.0	3.5	3.5	4.0
Aggregate Base ²	4.0	4.0	4.0	5.0	7.0

1. See **Project Description** for more specifics regarding traffic assumptions.
2. All materials should meet the current Caltrans Highway Design Manual specifications.
 - Base – Caltrans Class 2 aggregate base
3. A minimum 1.5-inch surface course should be used on ACC pavements.

The following table provides our estimated minimum thickness of PCC pavements.

Portland Cement Concrete Design

Layer	Thickness (inches)			
	Traffic Category A ¹	Traffic Category B ¹	Traffic Category C ¹	Traffic Category E ¹
PCC ²	4.5	5.5	8.0	7.0
Aggregate Base ²	4.0	4.0	4.0	4.0

Portland Cement Concrete Design

Layer	Thickness (inches)			
	Traffic Category A ¹	Traffic Category B ¹	Traffic Category C ¹	Traffic Category E ¹

- 1. See [Project Description](#) for more specifics regarding traffic classifications.
- 2. All materials should meet the current Caltrans Highway Design Manual specifications.

Areas for parking heavy vehicles, concentrated turn areas, and start/stop maneuvers could require thicker pavement sections. Edge restraints (i.e. concrete curbs or aggregate shoulders) should be planned along curves and areas of maneuvering vehicles.

Although not required for structural support, a minimum 4-inch-thick base course layer is recommended to help reduce potential for slab curl, shrinkage cracking, and subgrade pumping through joints. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and doweled where necessary for load transfer. PCC pavement details for joint spacing, joint reinforcement, and joint sealing should be prepared in accordance with ACI 330 and ACI 325.

Where practical, we recommend early-entry cutting of crack-control joints in PCC pavements. Cutting of the concrete in its “green” state typically reduces the potential for micro-cracking of the pavements prior to the crack control joints being formed, compared to cutting the joints after the concrete has fully set. Micro-cracking of pavements may lead to crack formation in locations other than the sawed joints, and/or reduction of fatigue life of the pavement.

Openings in pavements, such as decorative landscaped areas, are sources for water infiltration into surrounding pavement systems. Water can collect in the islands and migrate into the surrounding subgrade soils thereby degrading support of the pavement. Islands with raised concrete curbs, irrigated foliage, and low permeability near-surface soils are particular areas of concern. The civil design for the pavements with these conditions should include features to restrict or collect and discharge excess water from the islands. Examples of features are edge drains connected to the stormwater collection system, longitudinal subdrains, or other suitable outlets and impermeable barriers preventing lateral migration of water such as a cutoff wall installed to a depth below the pavement structure.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

The pavement surfacing, and adjacent sidewalks should be sloped to provide rapid drainage of surface water. Water should not be allowed to pond on or adjacent to these grade-supported slabs, since this could saturate the subgrade and contribute to premature pavement or slab deterioration. In areas where pavement sections abut bioswales, curb should extend below the planned AB section to intercept water infiltration below the pavement section. Water migration in and out of the pavement sections may result in repeated shrinkage and swelling and increasing pavement section fatigue.

Pavement Maintenance

The pavement sections represent the minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack, and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.

- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, as noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials, or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damage due to vibration, modification of groundwater/surface water

Geotechnical Engineering Report

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flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing. This report should not be used after 3 years without written authorization from Terracon.

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Lodi Middle School Additions | Lodi, San Joaquin County, California

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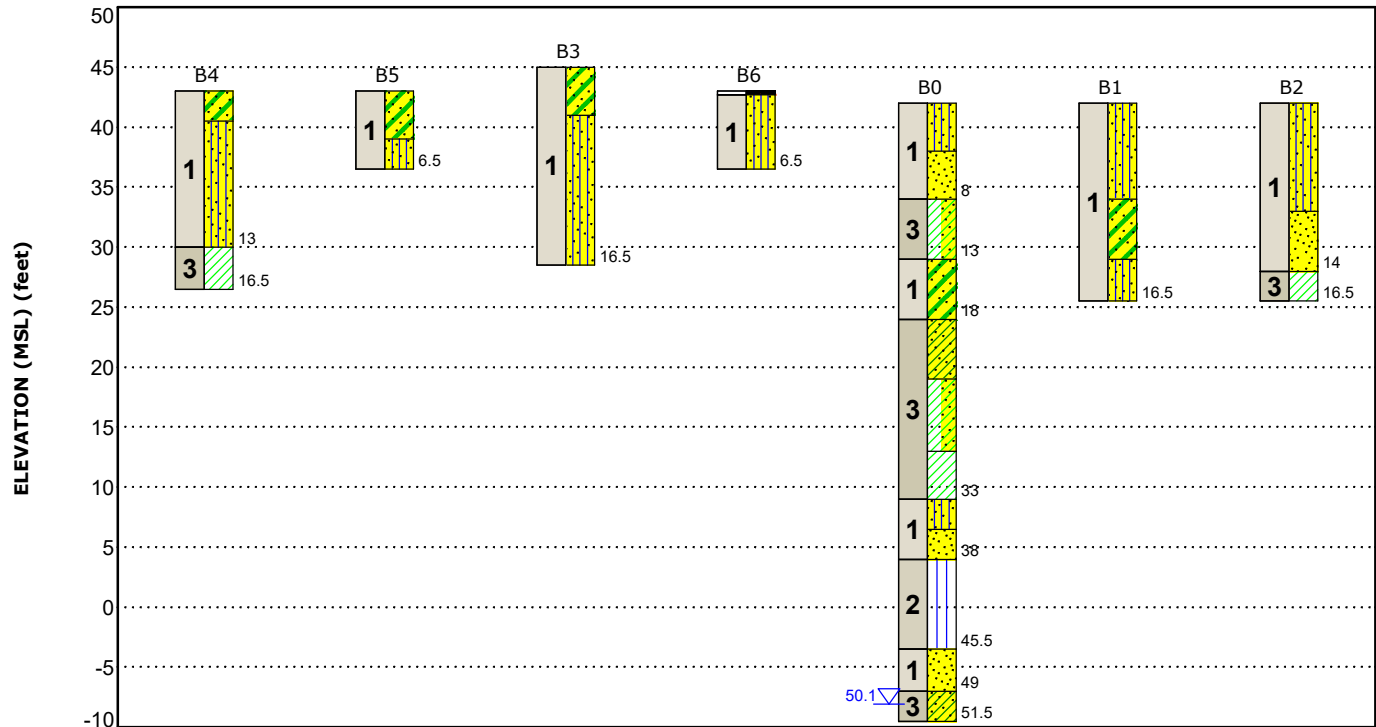


Figures

Contents:

GeoModel

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description	Legend	
1	Sand	Loose to very dense, fine to coarse grained, poorly graded sand with various amounts of silt or clay	Silty Sand	Poorly-graded Sand
2	Silt	Stiff silt	Lean Clay with Sand	Clayey Sand
3	Clay	Very stiff to hard, lean clay with various amounts of sand	Sandy Lean Clay	Lean Clay
			Silt	Asphalt
			Aggregate Base Course	

First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

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Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings/CPTs	Approximate Boring/CPT Depth (feet)	Location
1	51½	Multi-purpose building
4	16½	Classrooms/multi-purpose building
2	6½	Basketball courts/ Parking/ driveway area
2 CPT ³	12 to 17	Multi-purpose building
2 CPT ³	10 to 16	Classrooms

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) and referencing existing site features. Approximate ground surface elevations were estimated using Google Earth. If elevations and a more precise boring layout are desired, we recommend the exploration locations be surveyed.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted rotary drill rig using continuous flight augers (solid stem and/or hollow stem, as necessary, depending on soil conditions). Three samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. Ring-lined, split-barrel sampling procedures are similar to standard split spoon sampling procedure; however, blow counts are typically recorded for 6-inch intervals for a total of 12 inches of penetration. For safety purposes, all borings were backfilled with cement grout after their completion. Pavements were patched with cold-mix asphalt.

We also observed the boreholes while drilling for the presence of groundwater. Groundwater was observed in boring B0 at approximately 50 feet bgs.

The sampling depths, penetration distances, and other sampling information were recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our

exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

For the cone penetrometer testing, the CPT rig hydraulically pushed an instrumented cone through the soil while nearly continuous readings were recorded to a portable computer. The cone was equipped with electronic load cells to measure tip resistance and sleeve resistance and a pressure transducer to measure the generated ambient pore pressure. The face of the cone has an apex angle of 60° and an area of 10 cm². Digital Data representing the tip resistance, friction resistance, pore water pressure, and probe inclination angle were recorded about every 2 centimeters while advancing through the ground at a rate between 1½ and 2½ centimeters per second. These measurements were correlated to various soil properties used for geotechnical design. In addition, seismic shear-wave velocities were measured between 2 to 15 feet. No soil samples were gathered through this subsurface investigation technique. CPT testing was conducted in general accordance with ASTM D5778 "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils."

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Water content
- Unit dry weight
- Atterberg limits
- Grain size analysis
- Expansion Index
- Chemical analyses – pH, sulfates, chloride ion, electrical resistivity
- Hveem Stabilometer (R-Value)

The laboratory testing program often included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan
Subsurface Profile Cross Section A-A'
Subsurface Profile Cross Section B-B'
Geologic Map
Regional Faults
Regional Seismicity
Oil and Gas Map

Note: All attachments are one page unless otherwise noted.

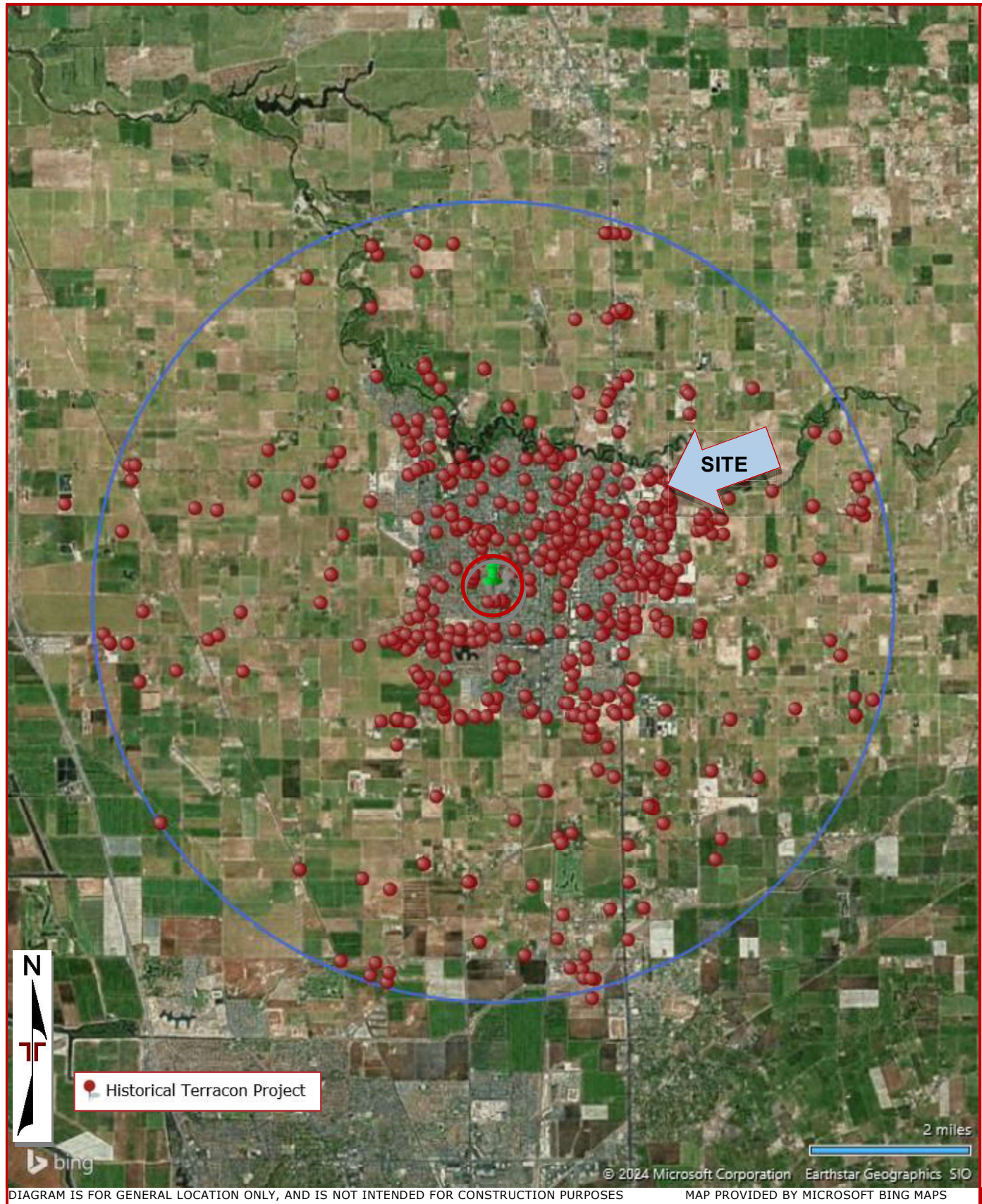
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Site Location



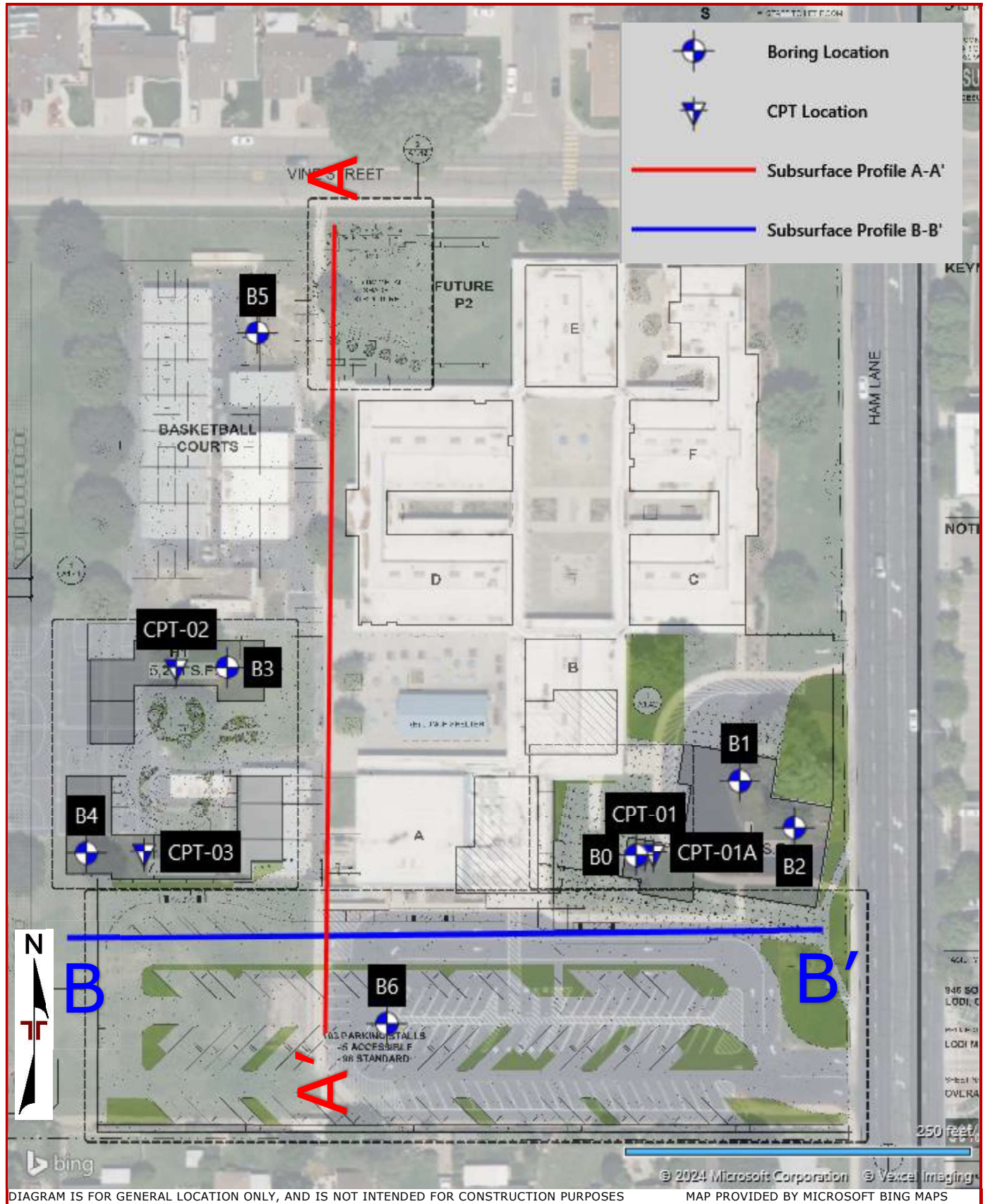
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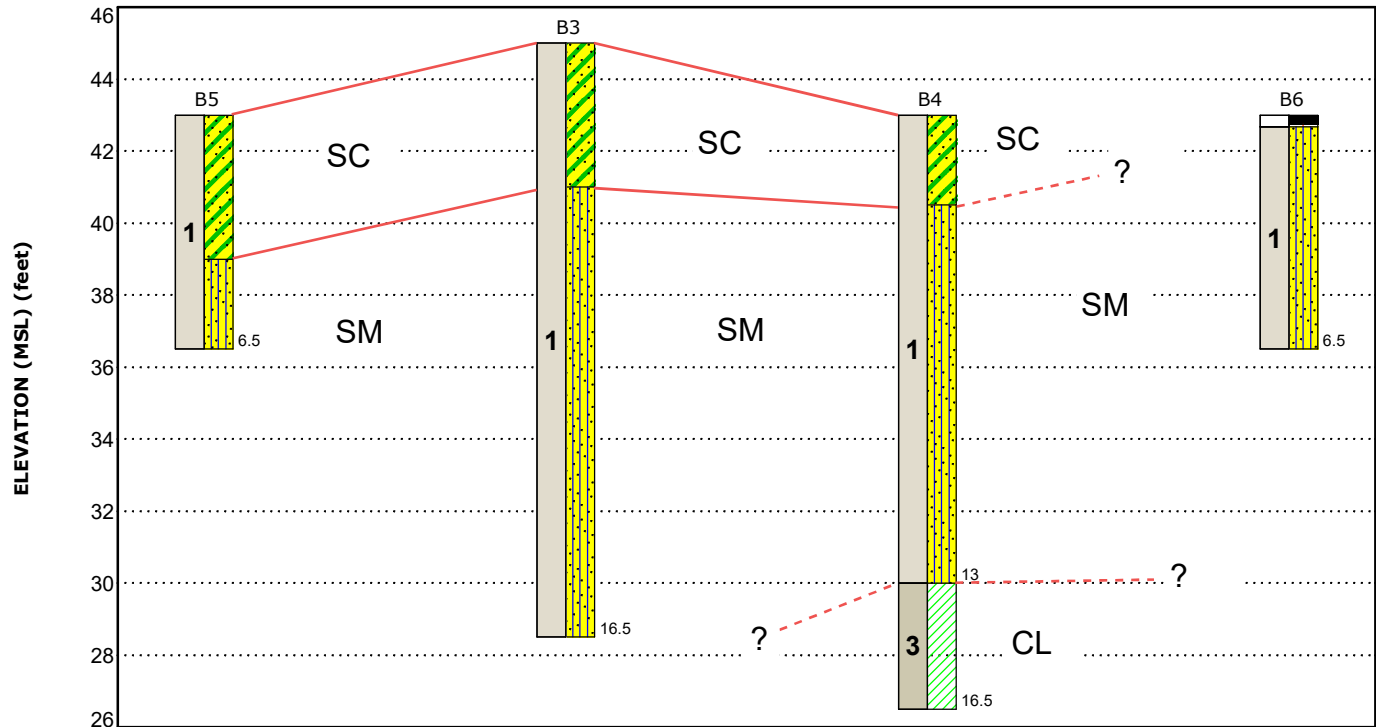
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Exploration Plan



Subsurface Profile A-A'



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

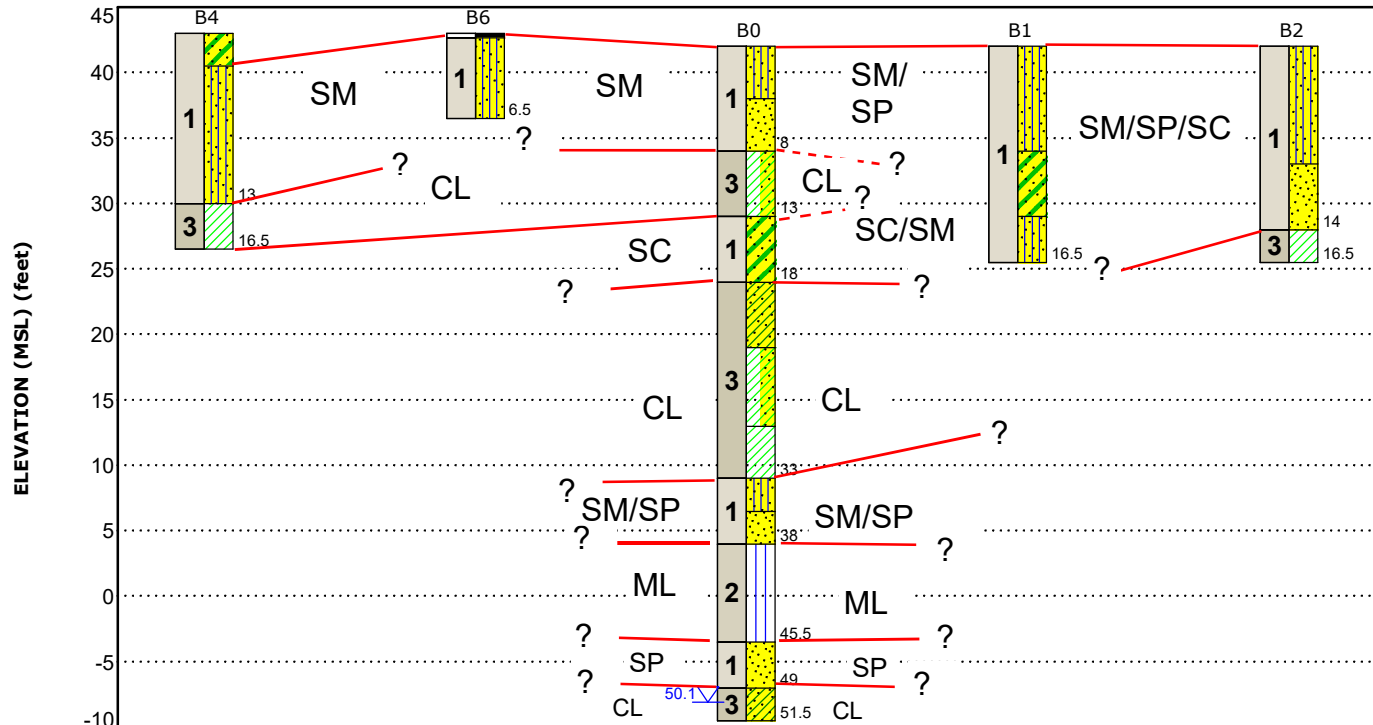
Model Layer	Layer Name	General Description	Legend	
1	Sand	Loose to very dense, fine to coarse grained, poorly graded sand with various amounts of silt or clay	Clayey Sand	Silty Sand
2	Silt	Stiff silt	Lean Clay	Asphalt
3	Clay	Very stiff to hard, lean clay with various amounts of sand	Aggregate Base Course	

First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

Subsurface Profile B-B'



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description	Legend	
1	Sand	Loose to very dense, fine to coarse grained, poorly graded sand with various amounts of silt or clay	Silty Sand	Poorly-graded Sand
2	Silt	Stiff silt	Lean Clay with Sand	Clayey Sand
3	Clay	Very stiff to hard, lean clay with various amounts of sand	Sandy Lean Clay	Lean Clay
			Silt	Asphalt
			Aggregate Base Course	

First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:

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Numbers adjacent to soil column indicate depth below ground surface.

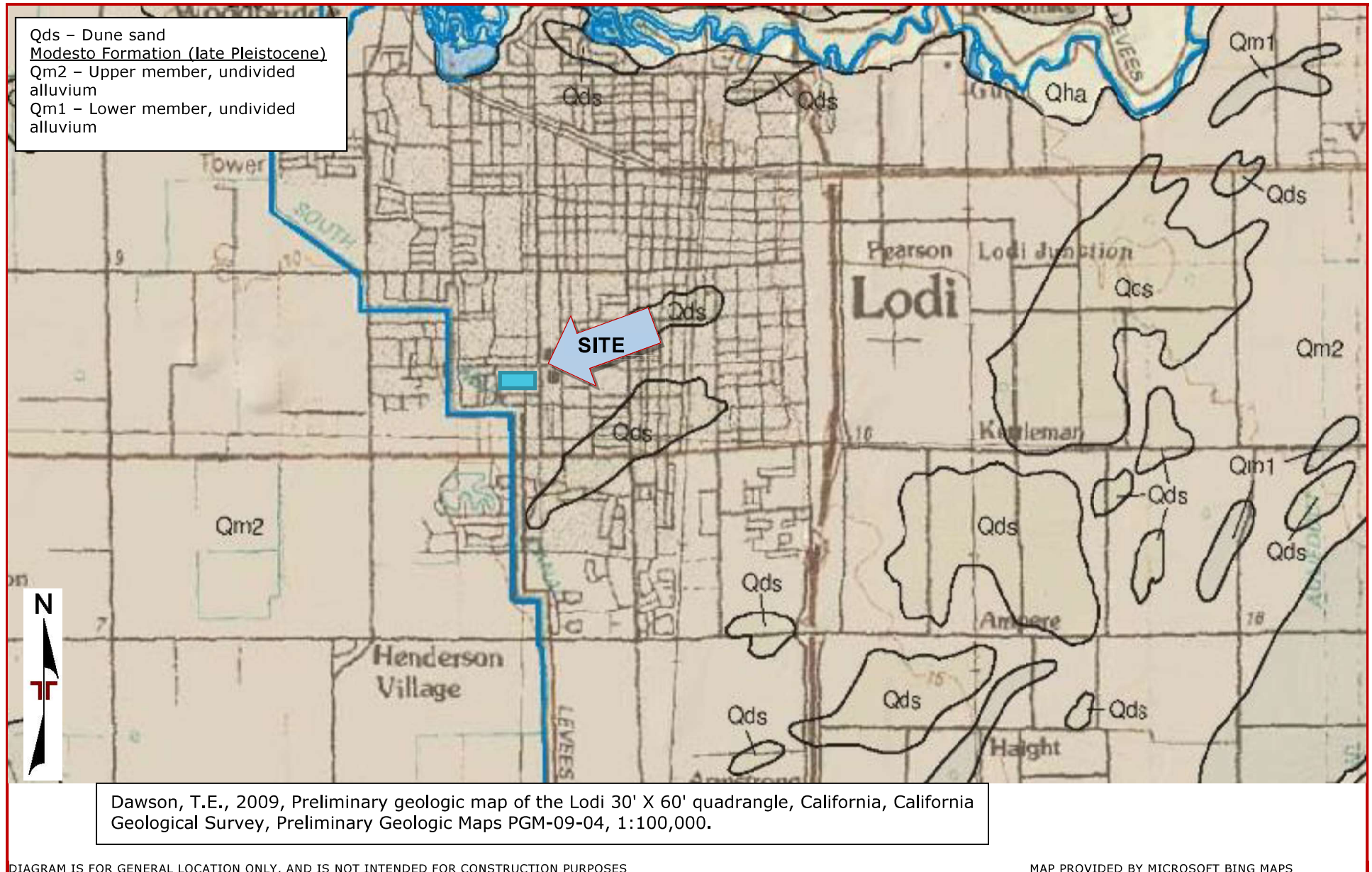
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Geologic Map





Regional Faults

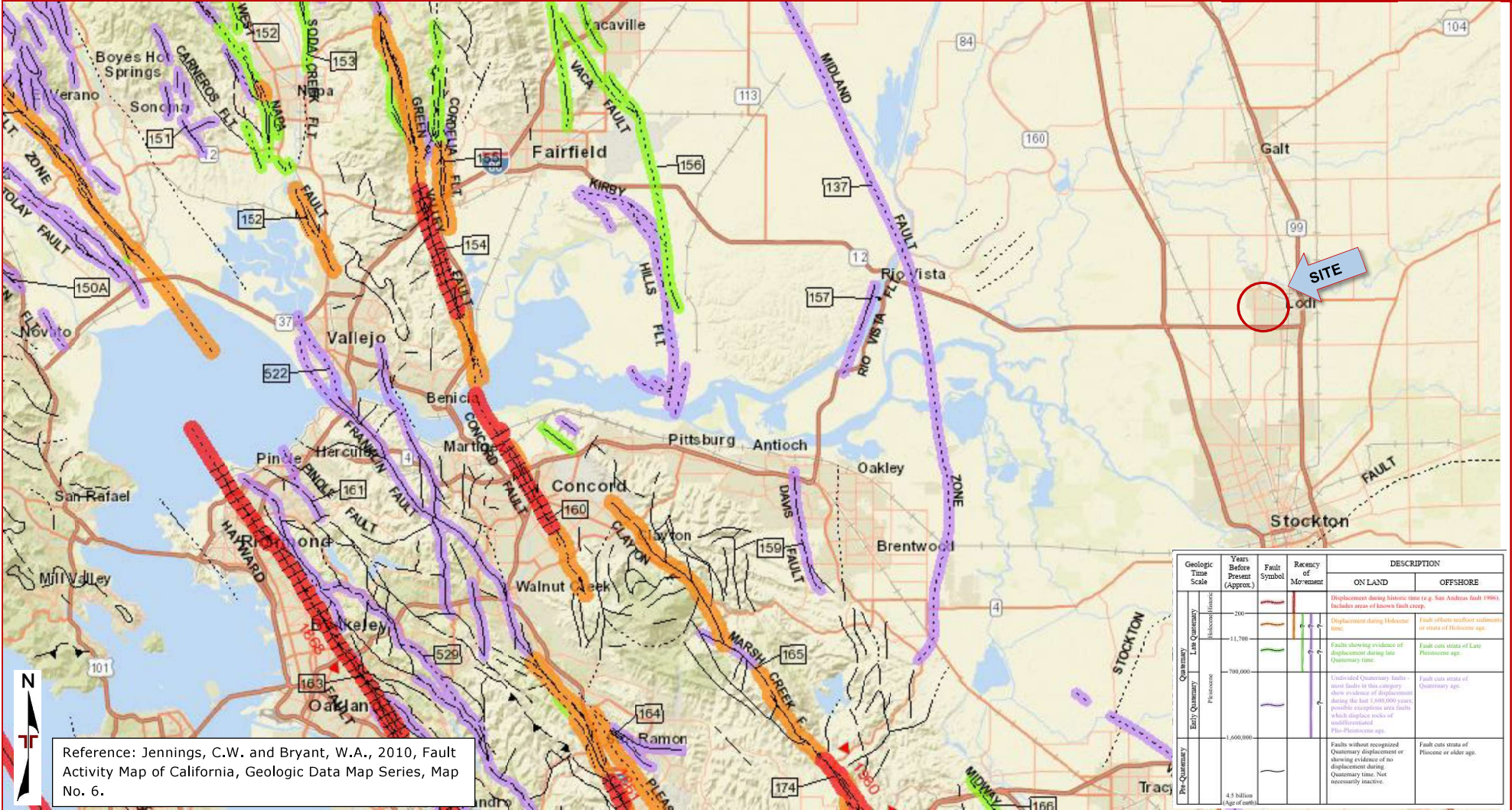


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Geologic Time Scale	Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION	
				ON LAND	OFFSHORE
Quaternary	Less than 11,700			Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	Fault offsets surface sediments or strata of Holocene age.
				Displacement during Holocene time.	Fault cuts strata of Late Pleistocene age.
Quaternary	11,700 - 700,000			Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Quaternary age.
				Unvalidated Quaternary faults - most faults in this category show evidence of displacement during the last 5,000,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
Quaternary	700,000 - 1,600,000			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.
Pre-Quaternary	4.5 billion (Age of earth)				

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Regional Seismicity

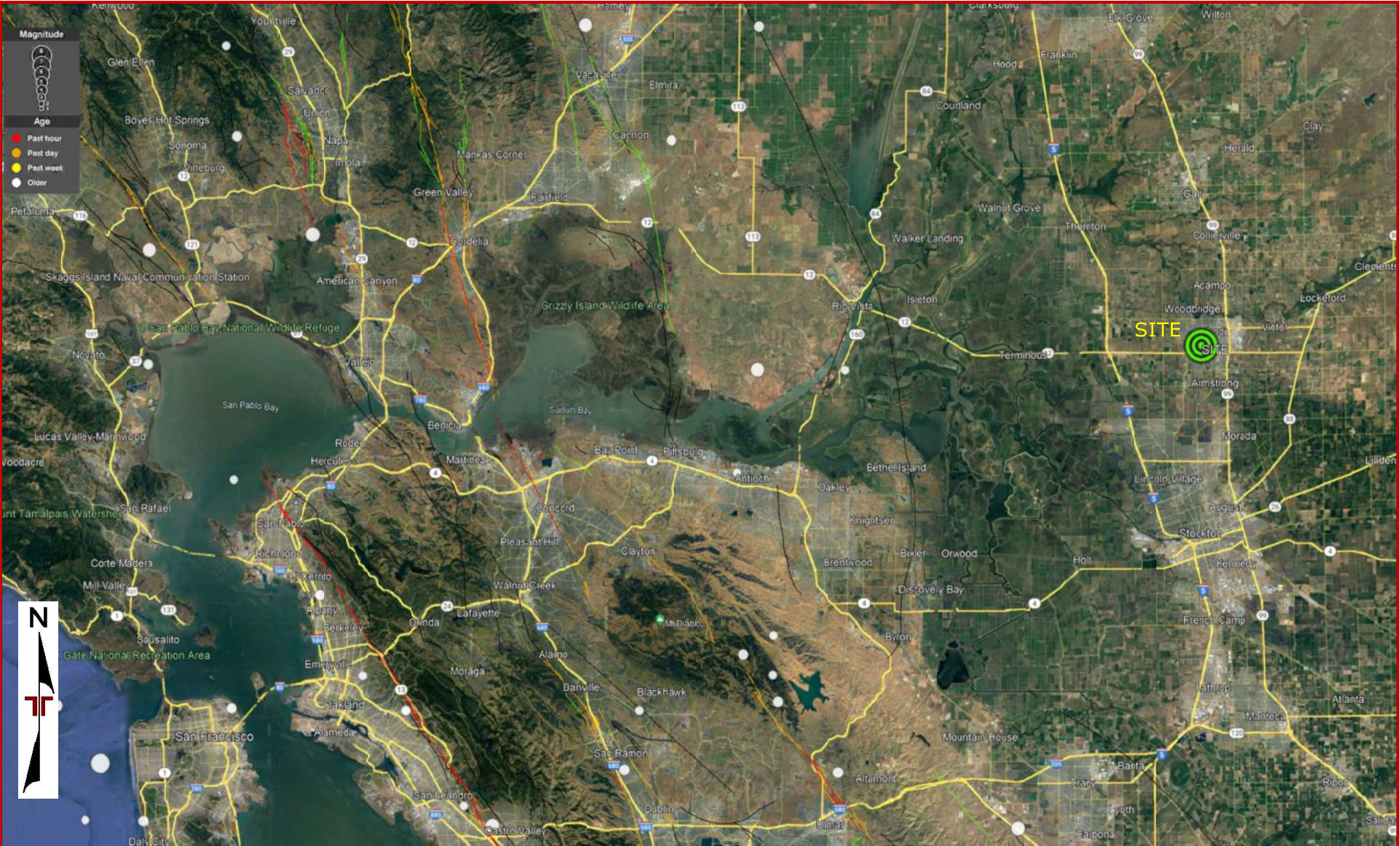


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MAP PROVIDED BY MICROSOFT BING MAPS

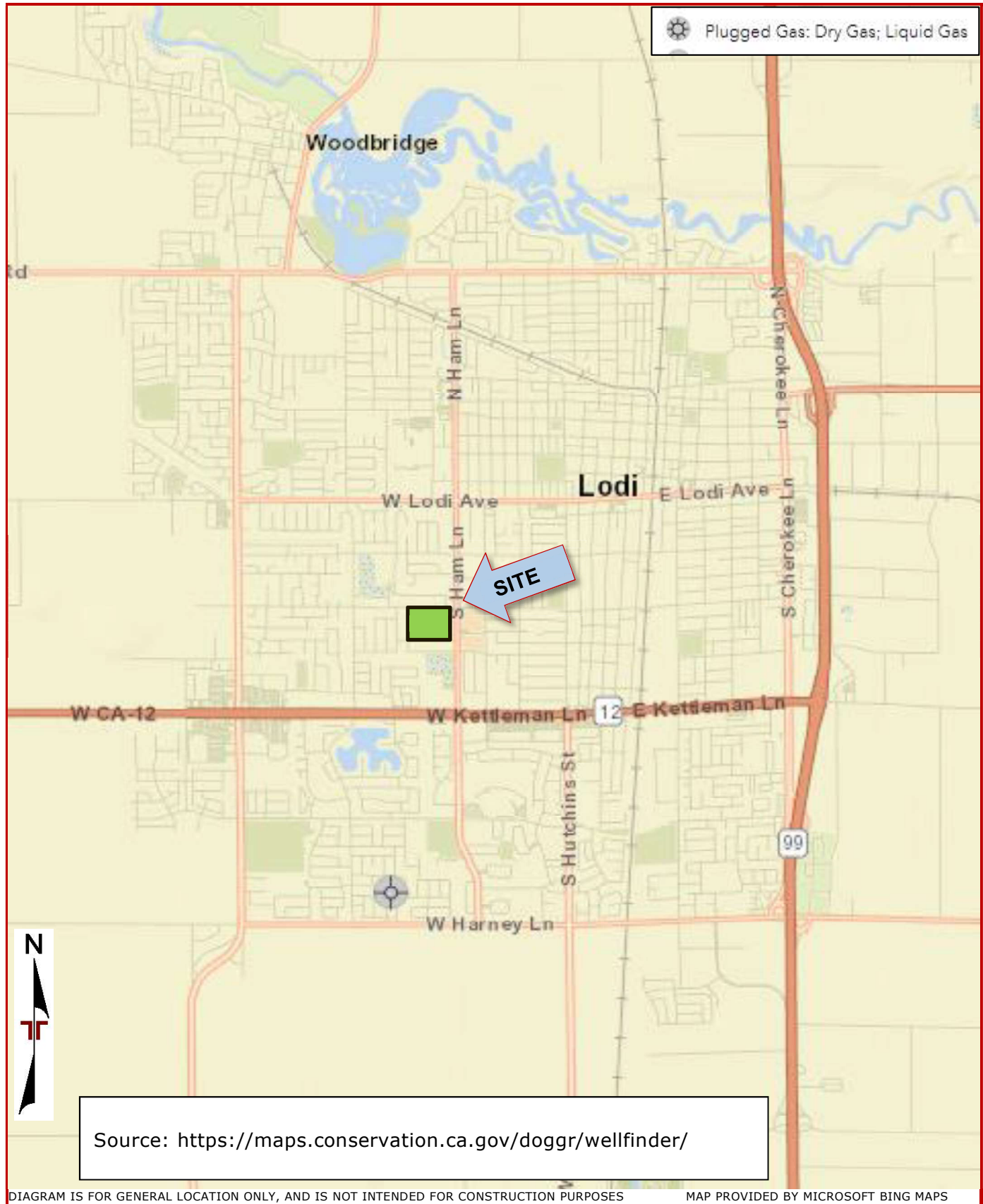
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Oil and Gas Map



Exploration and Laboratory Results

Contents:

Boring Logs (B0 through B6)
CPT Logs (CPT-01 through CPT-03)
Pore Pressure Dissipation (4 pages)
Atterberg Limits
R-Value
Corrosivity

Note: All attachments are one page unless otherwise noted.

Boring Log No. B0

Model Layer	Graphic Log	Location: See Exploration Plan		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	HP (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
		Latitude: 38.1214° Longitude: -121.2889°	Elevation: 42 (Ft.) +/-									LL-PL-PI	
1		SILTY SAND (SM) , tan, very dense											
		fine grained, dark brown, dense					3-3-50/5"			3.0	95		
							14-15-21			5.2	118	NP	42
		POORLY GRADED SAND (SP) , fine to medium grained, dark brown, dense					13-14-19 N=33			5.6			
3		LEAN CLAY WITH SAND (CL) , brown, hard											
							19-46-50/5"			8.7			
1		CLAYEY SAND (SC) , fine to medium grained, yellowish brown, dense											
							13-17-22 N=39			10.1			
3		SANDY LEAN CLAY (CL) , brown, very stiff											
							10-14-19 N=33			10.3			
		LEAN CLAY WITH SAND (CL) , brown, hard											
							11-19-33 N=52		4.5 (HP)	13.7		22-13-9	

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.
Elevation Reference: Elevations Estimated Using Google Earth

Notes

Water Level Observations

While drilling

Drill Rig

D-90 Track

Hammer Type

Automatic

Driller

Terracon

Logged by

J. Neilsen

Boring Started

07-10-2024

Boring Completed

07-10-2024

Advancement Method

6 inch Hollow Stem Auger

Abandonment Method

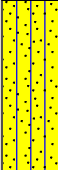
Boring backfilled with cement grout upon completion.

Boring Log No. B0

Model Layer	Graphic Log	Location: See Exploration Plan		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	HP (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
		Latitude: 38.1214° Longitude: -121.2889°										LL-PL-PI	
3		Depth (Ft.) Elevation: 42 (Ft.) +/-											
		LEAN CLAY WITH SAND (CL) , brown, hard (continued)		29.0									
		LEAN CLAY (CL) , low plasticity, very stiff		13									
1				30									
				33.0									
		SILTY SAND (SM) , fine to coarse grained, brown, dense		9									
1				35									
				35.5									
		POORLY GRADED SAND (SP) , fine to coarse grained, brown with white, dense		6.5									
2				38.0									
		SILT (ML) , brownish gray, stiff		4									
				40									
1				45									
				45.5									
		POORLY GRADED SAND (SP) , fine to coarse grained, brown, very dense		-3.5									
3				50									
				49.0									
		SANDY LEAN CLAY (CL) , brown, very stiff		-7									
				51.5									
		Boring Terminated at 51.5 Feet		-9.5									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations Estimated Using Google Earth	Water Level Observations  While drilling	Drill Rig D-90 Track
		Hammer Type Automatic
Notes	Advancement Method 6 inch Hollow Stem Auger	Driller Terracon
		Logged by J. Neilsen
	Abandonment Method Boring backfilled with cement grout upon completion.	Boring Started 07-10-2024
		Boring Completed 07-10-2024

Boring Log No. B1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 38.1216° Longitude: -121.2886° Depth (Ft.)Elevation: 42 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	HP (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
											LL-PL-PI	
1		SILTY SAND (SM) , fine to medium grained, brown, very dense										
						23-25-26			2.8	101		39
		fine to coarse grained				25-46-49			2.6	116		
			5									
		dense				15-16-25			2.4	105		23
		8.034										
		CLAYEY SAND (SC) , fine to coarse grained, brown, dense, weak cementation										
			10			10-13-21			3.0	110		
		13.029										
		SILTY SAND (SM) , fine to coarse grained, tan, dense										
			15			13-14-20			4.3	111		
		16.525.5										
		Boring Terminated at 16.5 Feet										

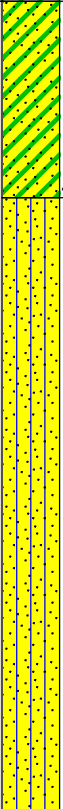
Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).	Water Level Observations	Drill Rig D-90 Track
	See Supporting Information for explanation of symbols and abbreviations.		
	Elevation Reference: Elevations Estimated Using Google Earth		
		Advancement Method 4 inch Solid Stem Auger	Hammer Type Automatic
		Abandonment Method Boring backfilled with cement grout upon completion.	Driller Terracon
			Logged by J. Neilsen
			Boring Started 07-10-2024
			Boring Completed 07-10-2024

Boring Log No. B2

Model Layer	Graphic Log	Location: See Exploration Plan	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	HP (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
		Latitude: 38.1215° Longitude: -121.2885°									LL-PL-PI	
Depth (Ft.)		Elevation: 42 (Ft.) +/-										
1		<u>SILTY SAND (SM)</u> , fine to medium grained, dark brown, very dense, weak cementation	5			23-50/5"			2.1	111		
		brown, dense										
		<u>POORLY GRADED SAND (SP)</u> , fine to coarse grained, brown, medium dense	10			7-8-10			3.7	94		
3		<u>LEAN CLAY (CL)</u> , with sand, gray, hard	15			19-20-33		4.5+ (HP)	24.1	90		
		Boring Terminated at 16.5 Feet										

Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations Estimated Using Google Earth	Water Level Observations	Drill Rig D-90 Track Hammer Type Automatic Driller Terracon
Notes		Advancement Method 4 inch Solid Stem Auger Abandonment Method Boring backfilled with cement grout upon completion.	Logged by J. Neilsen Boring Started 07-10-2024 Boring Completed 07-10-2024

Boring Log No. B3

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 38.1218° Longitude: -121.2899° Depth (Ft.) Elevation: 45 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	HP (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
											LL-PL-PI	
1		CLAYEY SAND (SC) , fine to medium grained, dark brown, very dense, weak cementation				43-45-50/5"			4.8	133	NP	41
		brown, dense				23-25-15	0		6.2	120		
		SILTY SAND (SM) , fine to medium grained, brown, medium dense	5			5-6-8			7.2	95		
		tannish brown, very dense	10			8-44-36			20.0	99		35
		brown	15			28-25-36			14.6	111		
		Boring Terminated at 16.5 Feet										

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations Estimated Using Google Earth	Water Level Observations	Drill Rig D-90 Track
		Hammer Type Automatic
		Driller Terracon
Notes	Advancement Method 6 inch Hollow Stem Auger	Logged by J. Neilsen
	Abandonment Method Boring backfilled with cement grout upon completion.	Boring Started 07-10-2024
		Boring Completed 07-10-2024

Boring Log No. B4

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 38.1214° Longitude: -121.2903° Depth (Ft.) Elevation: 43 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	HP (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
											LL-PL-PI	
1		CLAYEY SAND (SC) , fine to medium grained, dark brown, very dense, weak cementation	2.5			45-50/5"			3.3	99		
		SILTY SAND (SM) , fine to medium grained, brown, dense	40.5			18-20-19			3.5	107		
		medium dense	5			10-14-14			2.6	95		
		tannish brown, very dense	10			21-50/5"			4.4	114		
			15			45-50/5"		4.5+ (HP)	22.1	100		
3		LEAN CLAY (CL) , with silt and sand, gray, hard	13.0									
		Boring Terminated at 16.5 Feet	16.5									

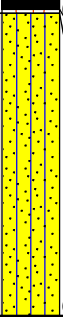
Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).	Water Level Observations	Drill Rig D-90 Track
	See Supporting Information for explanation of symbols and abbreviations.		
	Elevation Reference: Elevations Estimated Using Google Earth		
		Advancement Method 4 inch Solid Stem Auger	Hammer Type Automatic
		Abandonment Method Boring backfilled with cement grout upon completion.	Driller Terracon
			Logged by J. Neilsen
			Boring Started 07-10-2024
			Boring Completed 07-10-2024

Boring Log No. B5

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 38.1224° Longitude: -121.2898° Depth (Ft.) Elevation: 43 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	HP (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
											LL-PL-PI	
1		CLAYEY SAND (SC) , fine to medium grained, brown, medium dense loose 4.039	5			12-7-9			7.3	120		
						1-2-3			8.4	111		
						1-2-2			8.2	118		
		Boring Terminated at 6.5 Feet 6.536.5										

Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).	Water Level Observations	Drill Rig Geoprobe 3145 Hammer Type Automatic Driller Terracon
	See Supporting Information for explanation of symbols and abbreviations.		
	Elevation Reference: Elevations Estimated Using Google Earth		
		Advancement Method 6 inch Hollow Stem Auger	Logged by J. Neilsen Boring Started 07-09-2024 Boring Completed 07-09-2024
		Abandonment Method Boring backfilled with cement grout upon completion.	

Boring Log No. B6

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 38.1211° Longitude: -121.2895° Depth (Ft.) Elevation: 43 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	HP (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
											LL-PL-PI	
1		0.3 ASPHALT, 3 inches 42.75										
		0.3 AGGREGATE BASE COURSE, 1 inch 42.67										
		SILTY SAND (SM), fine to medium grained, brown, medium dense				8-8-5			7.1	120		
		loose				3-2-3			8.3	117		
		medium dense	5			3-5-8			10.4	122		
		6.5 36.5										
		Boring Terminated at 6.5 Feet										

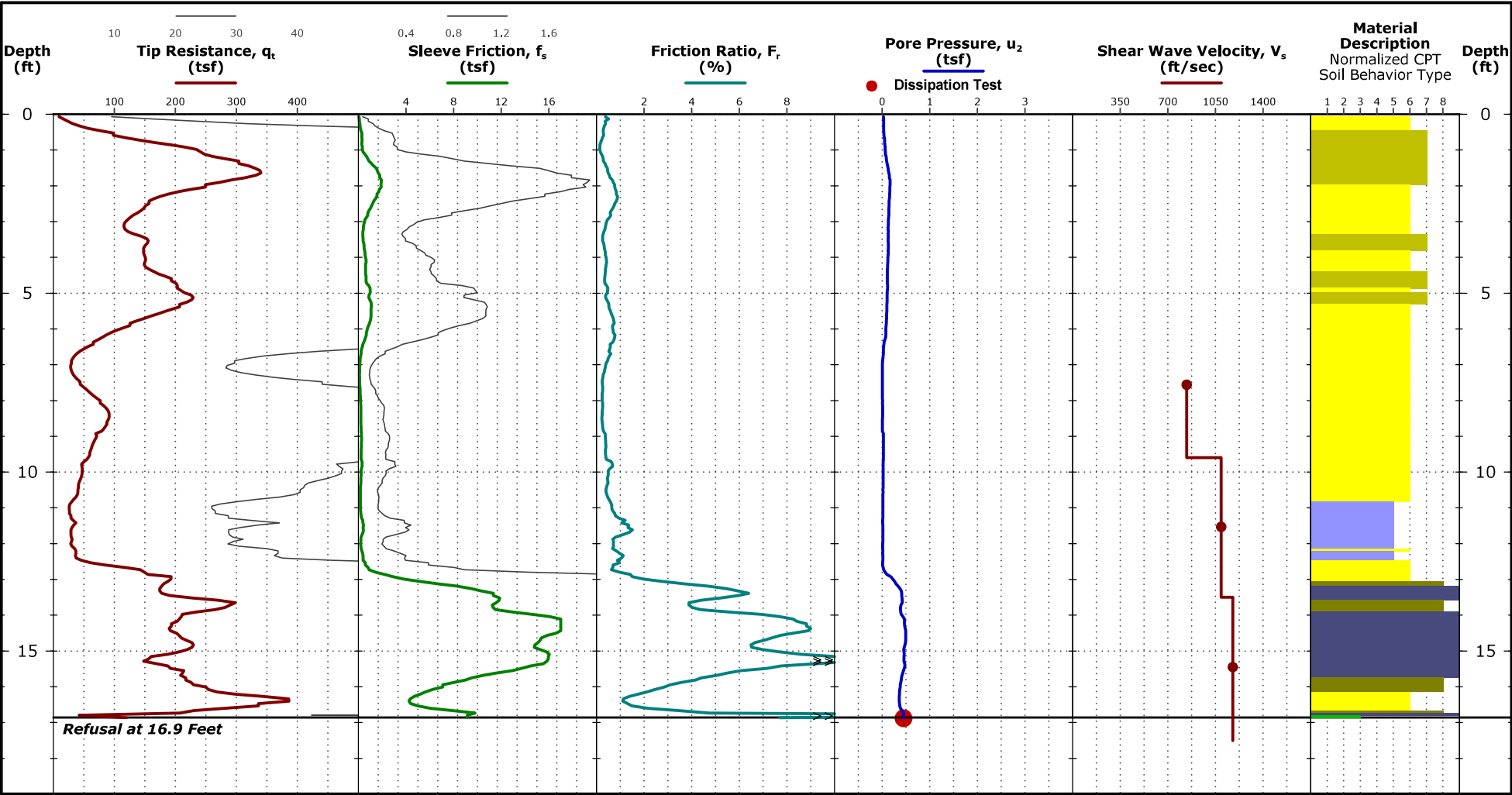
Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations Estimated Using Google Earth	Water Level Observations	Drill Rig Geoprobe 3145 Hammer Type Automatic Driller Terracon
		Advancement Method 6 inch Hollow Stem Auger Abandonment Method Boring backfilled with cement grout Surface Capped with Asphalt	Logged by J. Neilsen Boring Started 07-09-2024 Boring Completed 07-09-2024

CPT Sounding ID CPT-01



902 Industrial Way
Lodi, CA

CPT Started: 7/9/2024
CPT Completed: 7/9/2024



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data, if any.
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Test Location: See [Exploration Plan](#)

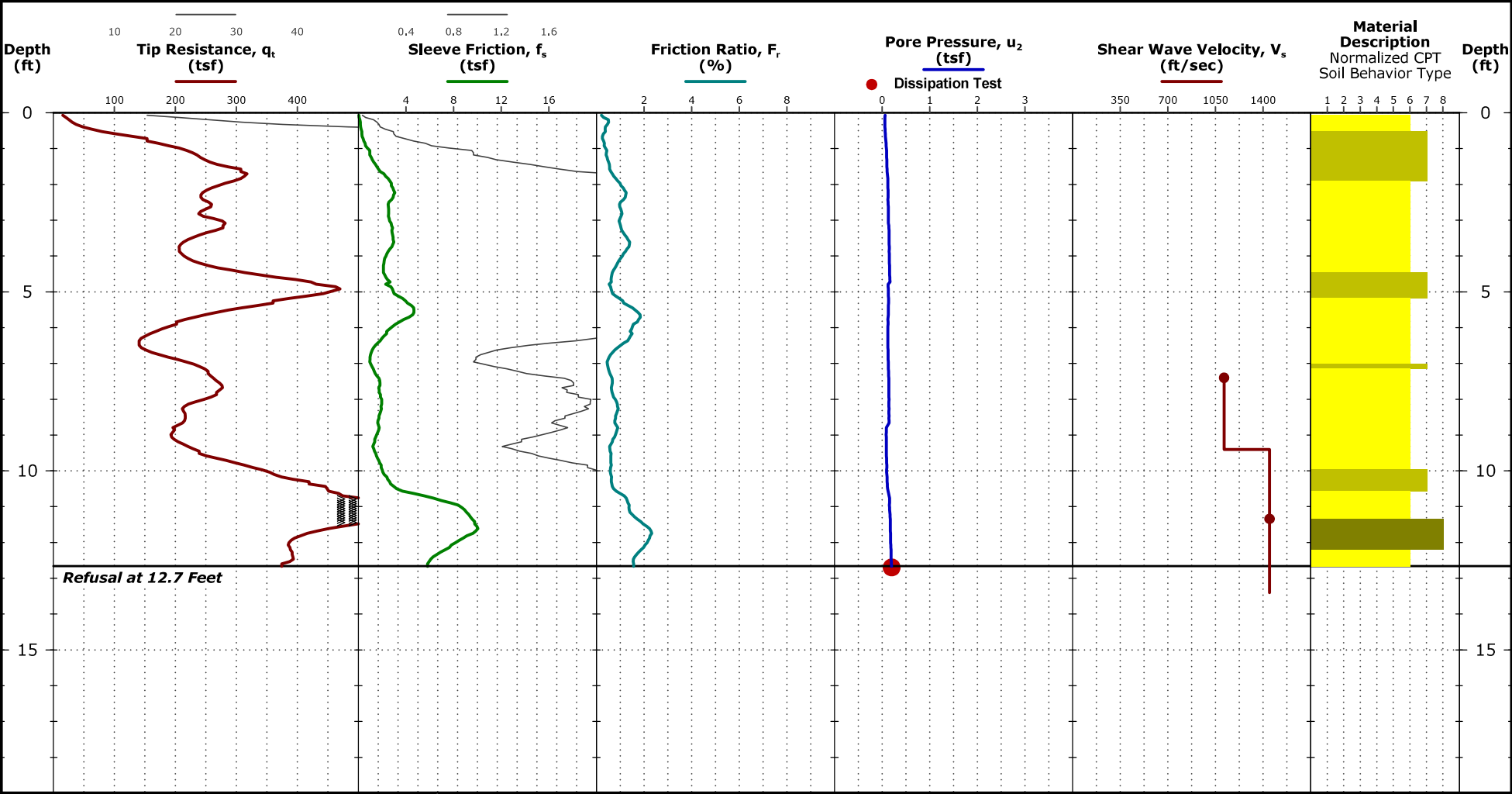
CPT Equipment

CPT Rig: Geoprobe 3145
Operator: E. Santellan
Auger anchors used as reaction force
CPT sensor calibration reports available upon request
Probe No. 5899 with net area ratio of .85
Manufactured by Geoprobe Systems- Calibrated 4/9/2024
Tip and sleeve areas of 10 cm² and 150 cm²

Normalized Soil Behavior Type (Robertson 1990)

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

CPT Sounding ID CPT-01A



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data, if any.
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes
Test Location: See [Exploration Plan](#)

CPT Equipment
CPT Rig: Geoprobe 3145
Operator: E. Santellan
Auger anchors used as reaction force
CPT sensor calibration reports available upon request
Probe No. 5899 with net area ratio of .85
Manufactured by Geoprobe Systems- Calibrated 4/9/2024
Tip and sleeve areas of 10 cm² and 150 cm²

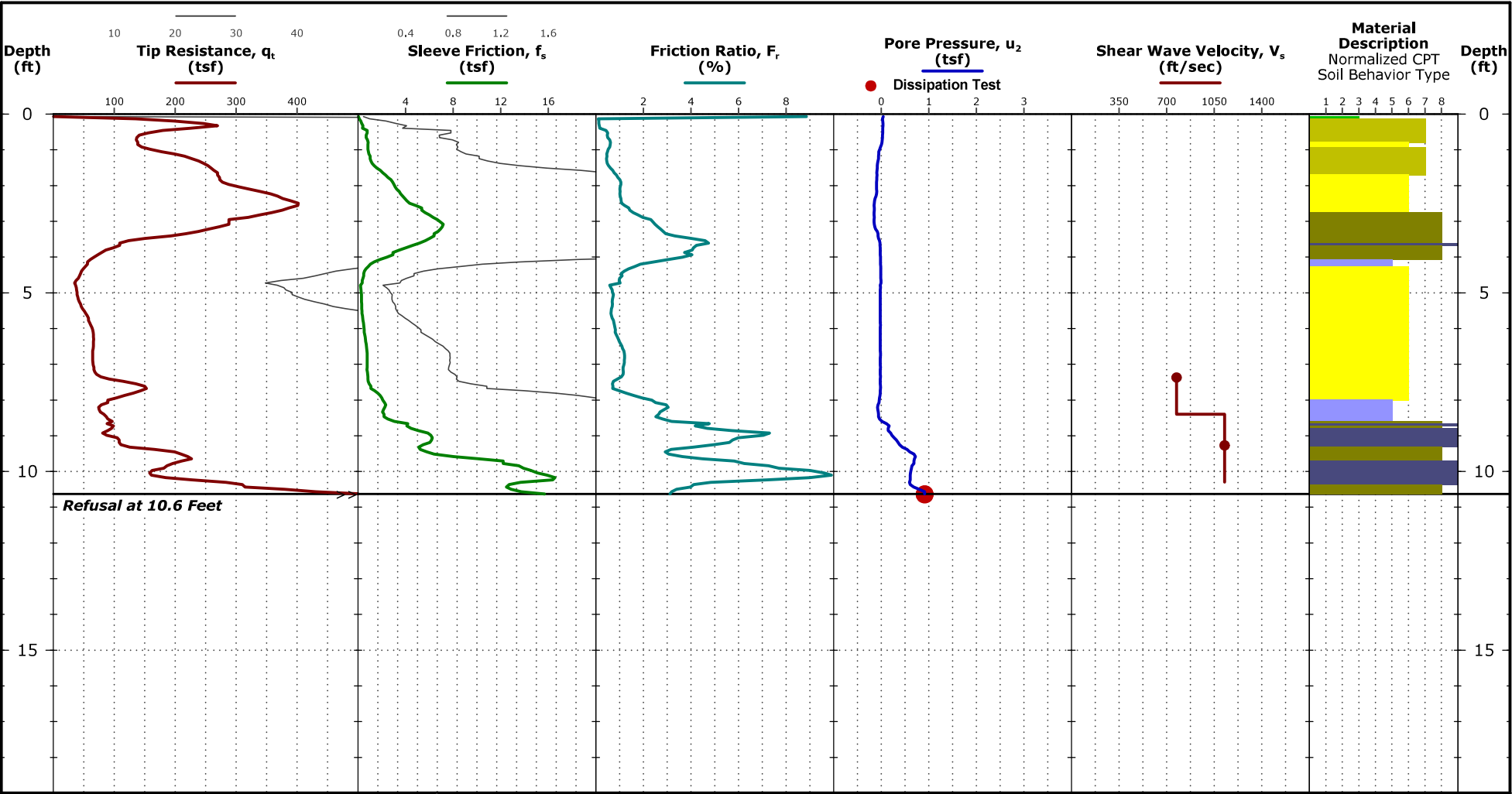
- Normalized Soil Behavior Type (Robertson 1990)**
- 1 Sensitive, fine grained
 - 2 Organic soils - clay
 - 3 Clay - silty clay to clay
 - 4 Silt mixtures - clayey silt to silty clay
 - 5 Sand mixtures - silty sand to sandy silt
 - 6 Sands - clean sand to silty sand
 - 7 Gravelly sand to dense sand
 - 8 Very stiff sand to clayey sand
 - 9 Very stiff fine grained

CPT Sounding ID CPT-02



902 Industrial Way
Lodi, CA

CPT Started: 7/9/2024
CPT Completed: 7/9/2024



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data, if any.
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Test Location: See [Exploration Plan](#)

CPT Equipment

CPT Rig: Geoprobe 3145
Operator: E. Santellan
Auger anchors used as reaction force
CPT sensor calibration reports available upon request
Probe No. 5899 with net area ratio of .85
Manufactured by Geoprobe Systems- Calibrated 4/9/2024
Tip and sleeve areas of 10 cm² and 150 cm²

Normalized Soil Behavior Type (Robertson 1990)

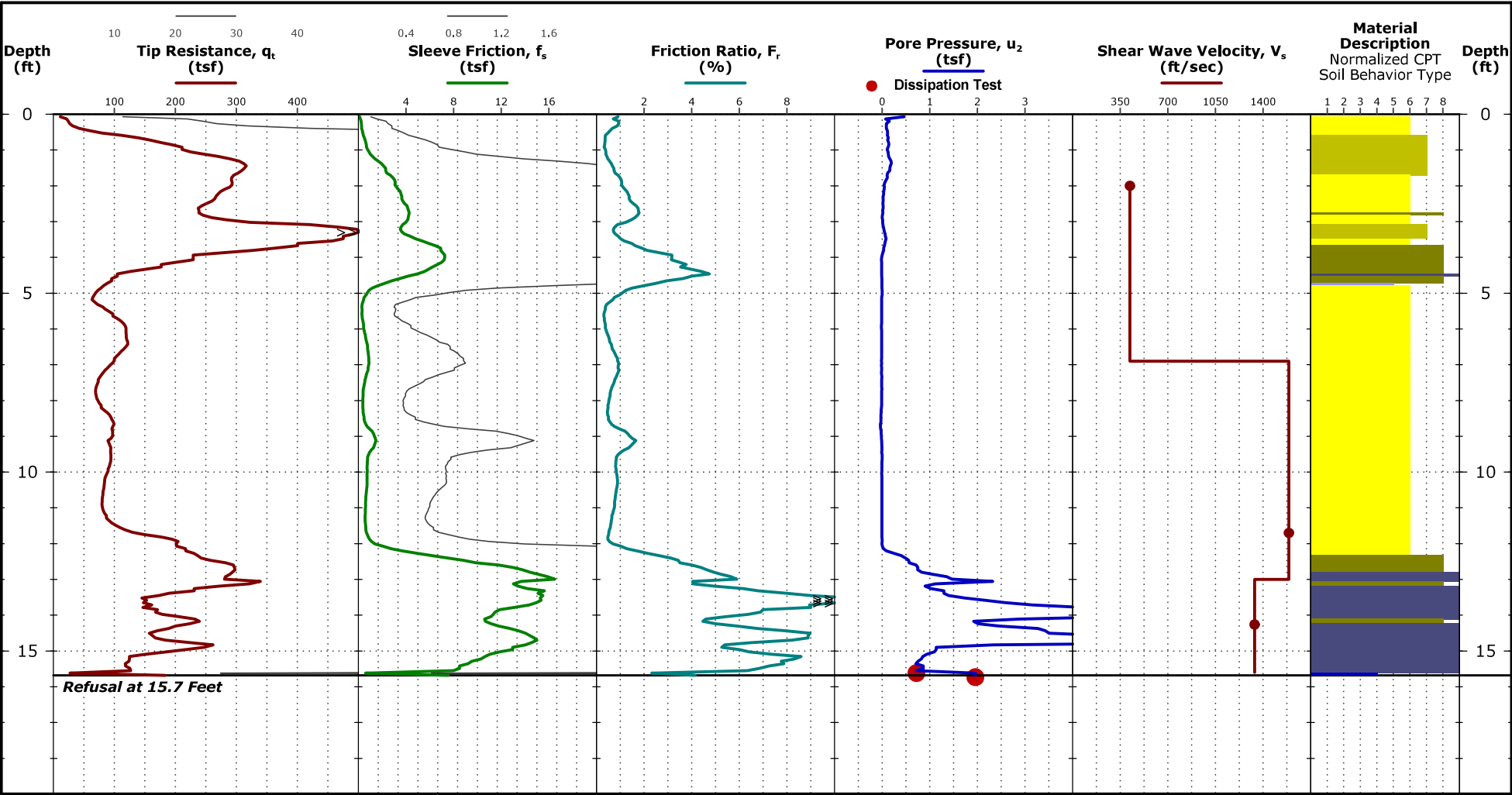
- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

CPT Sounding ID CPT-03



902 Industrial Way
Lodi, CA

CPT Started: 7/9/2024
CPT Completed: 7/9/2024



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data, if any.
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Test Location: See [Exploration Plan](#)

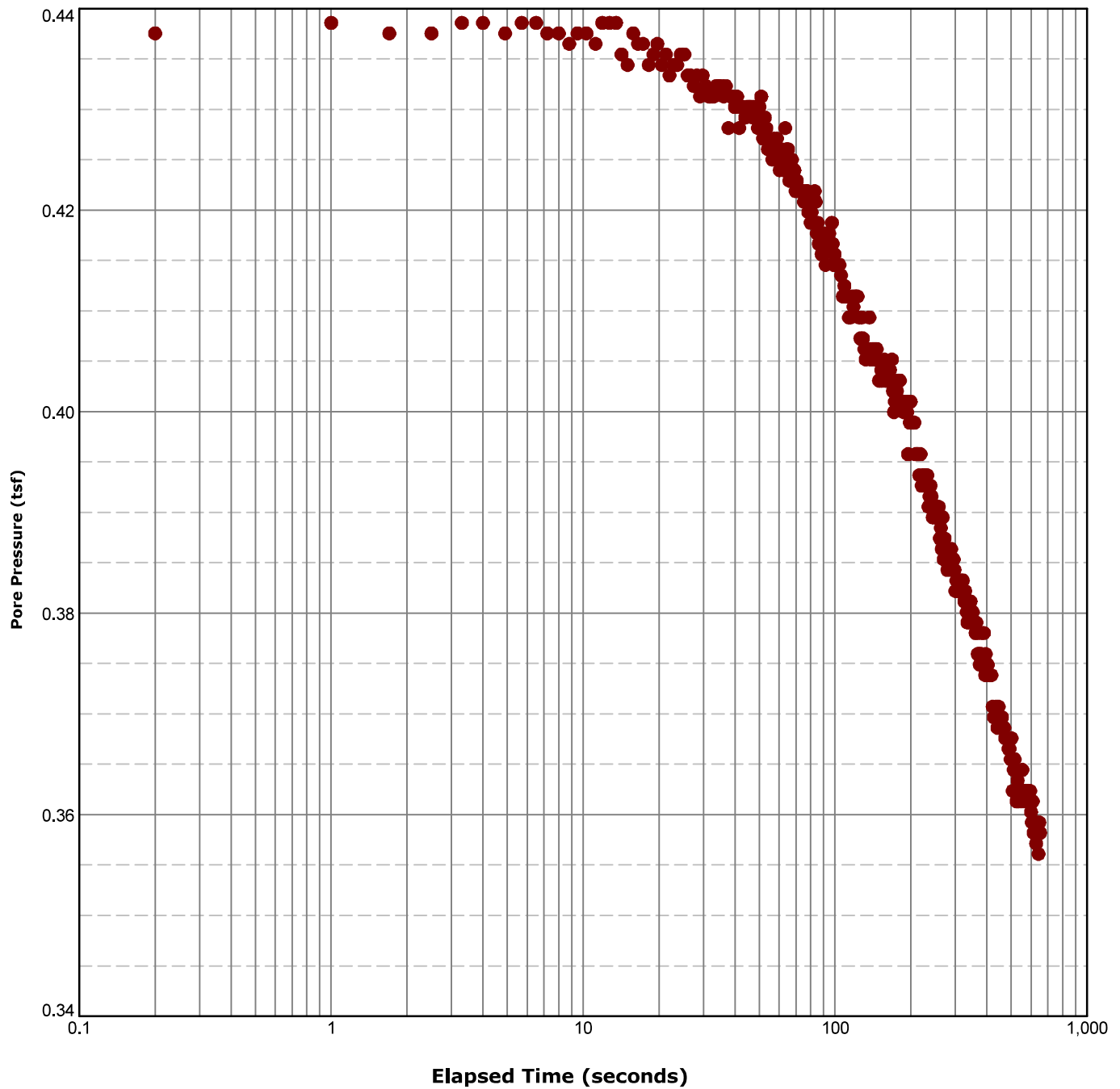
CPT Equipment

CPT Rig: Geoprobe 3145
Operator: E. Santellan
Auger anchors used as reaction force
CPT sensor calibration reports available upon request
Probe No. 5899 with net area ratio of .85
Manufactured by Geoprobe Systems- Calibrated 4/9/2024
Tip and sleeve areas of 10 cm² and 150 cm²

Normalized Soil Behavior Type (Robertson 1990)

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

Pore Pressure Dissipation Test Results

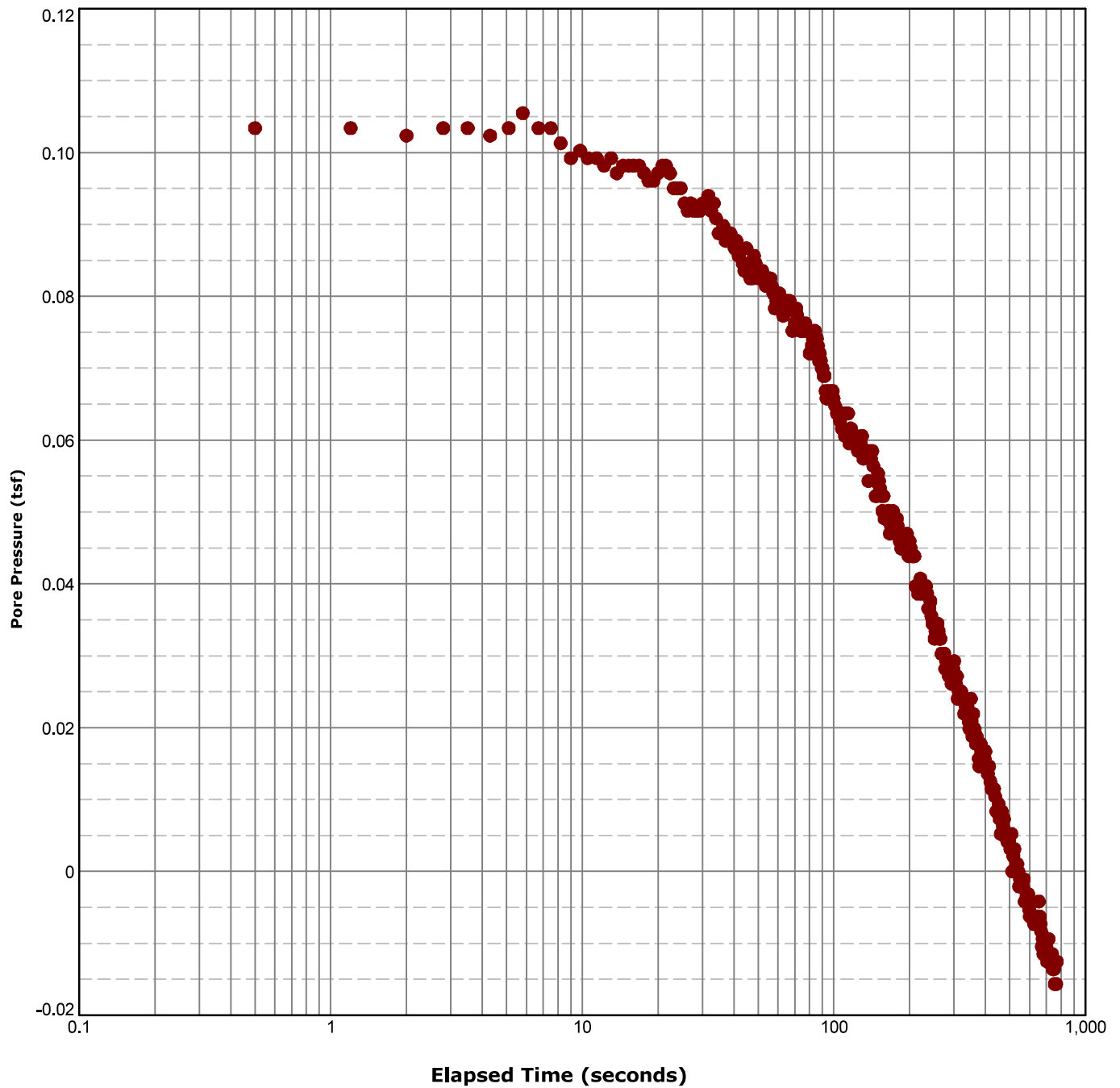


TEST: CPT-01

TEST DEPTH: 16.88 ft

TEST DURATION: 651 sec

Pore Pressure Dissipation Test Results

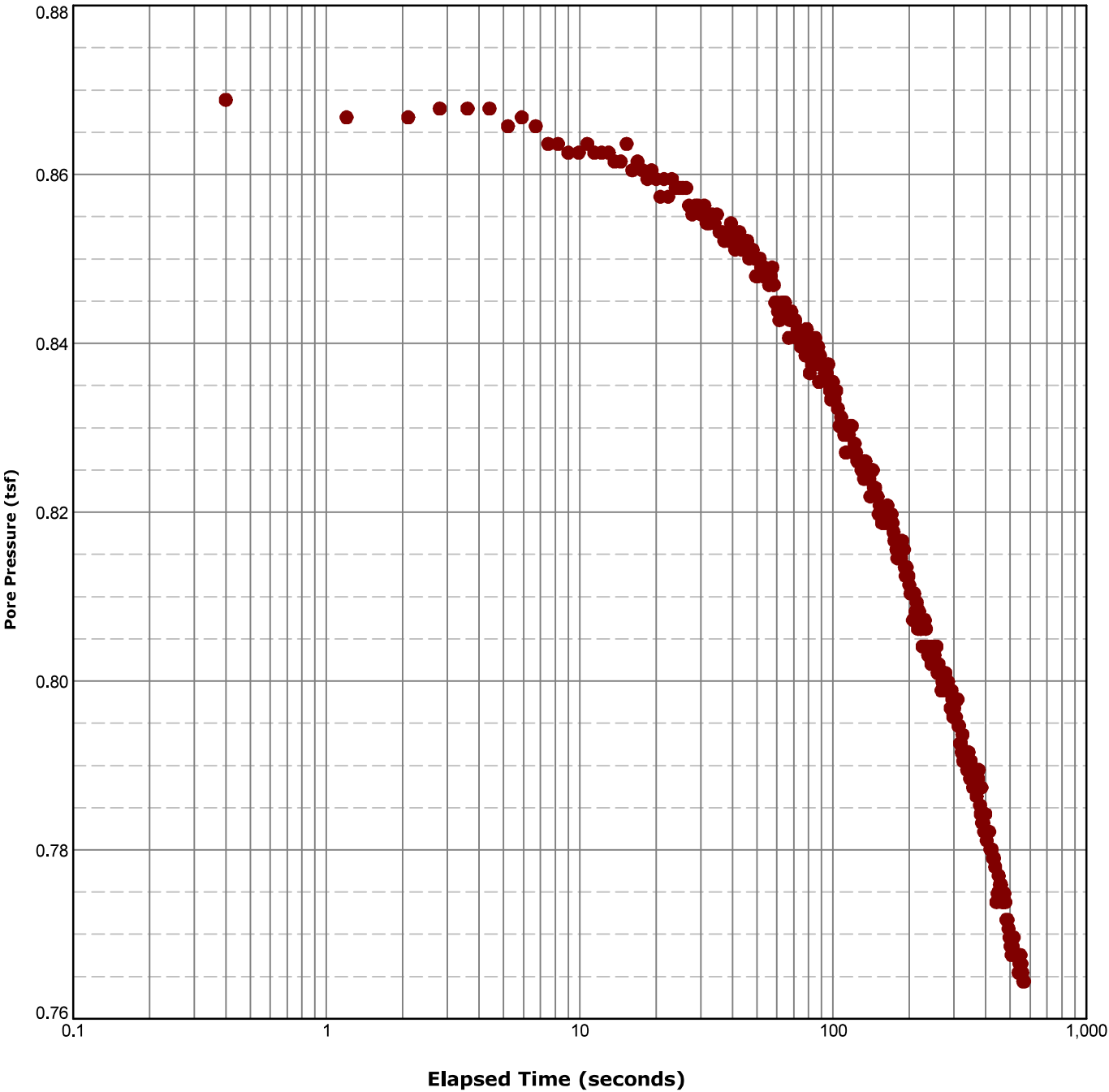


TEST: CPT-01A

TEST DEPTH: 12.697 ft

TEST DURATION: 769.2 sec

Pore Pressure Dissipation Test Results

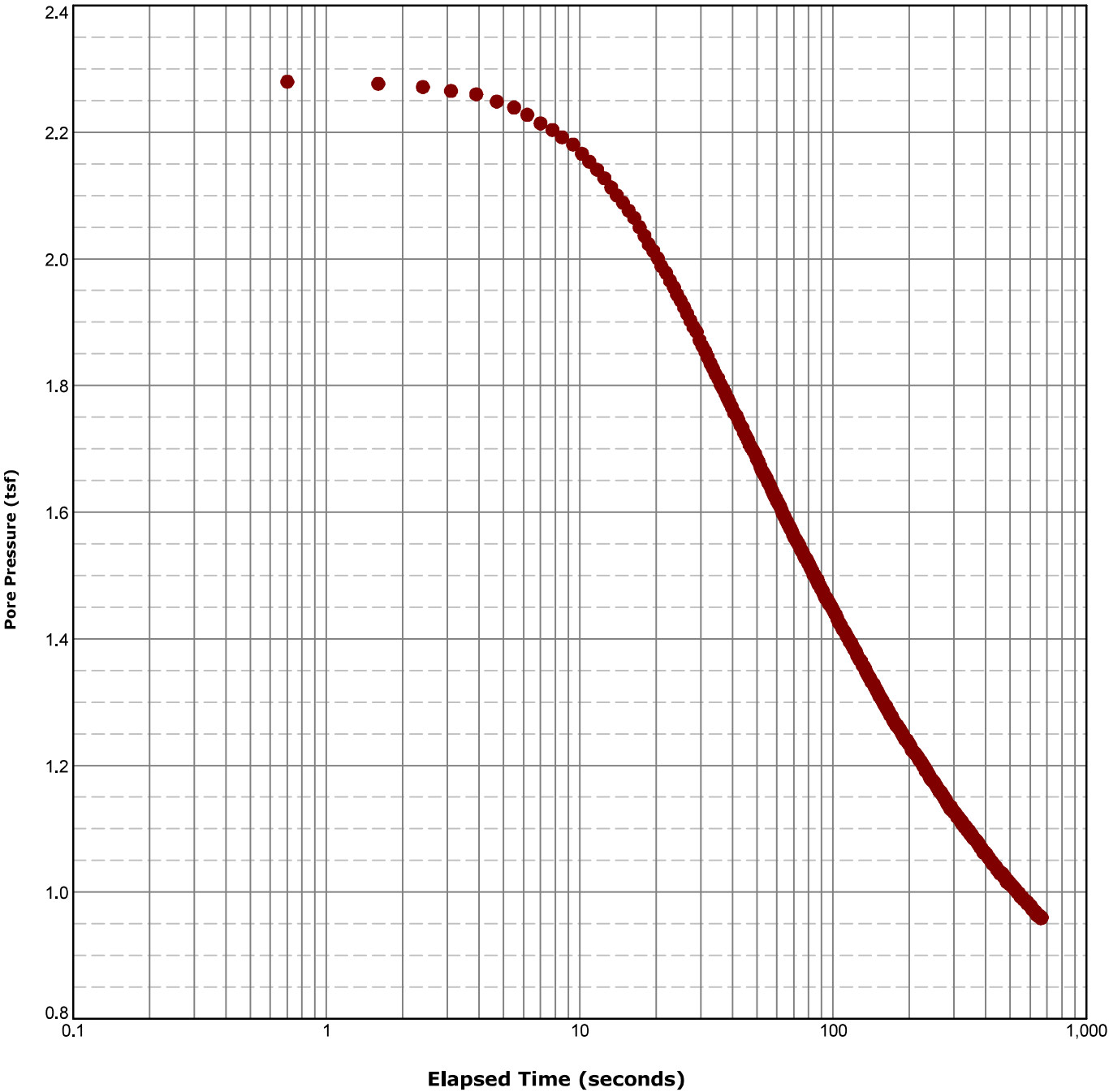


TEST: CPT-02

TEST DEPTH: 10.646 ft

TEST DURATION: 567.6 sec

Pore Pressure Dissipation Test Results



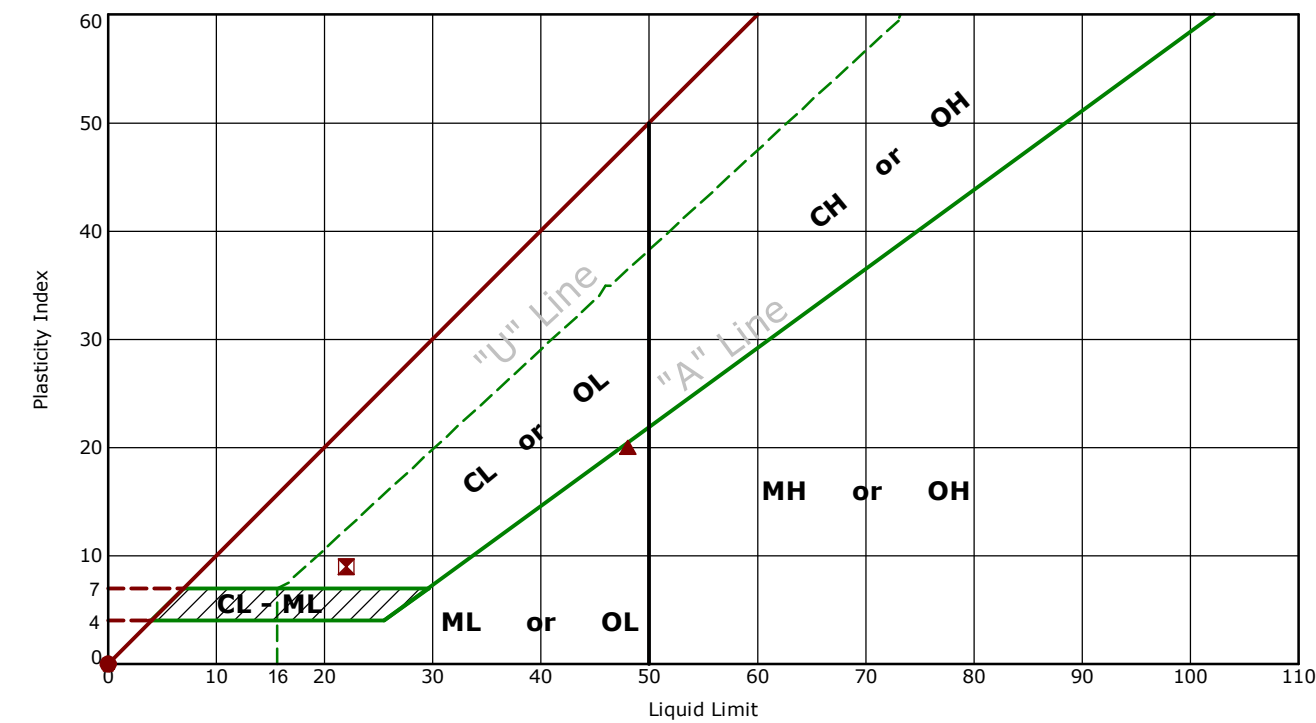
TEST: CPT-03

TEST DEPTH: 15.732 ft

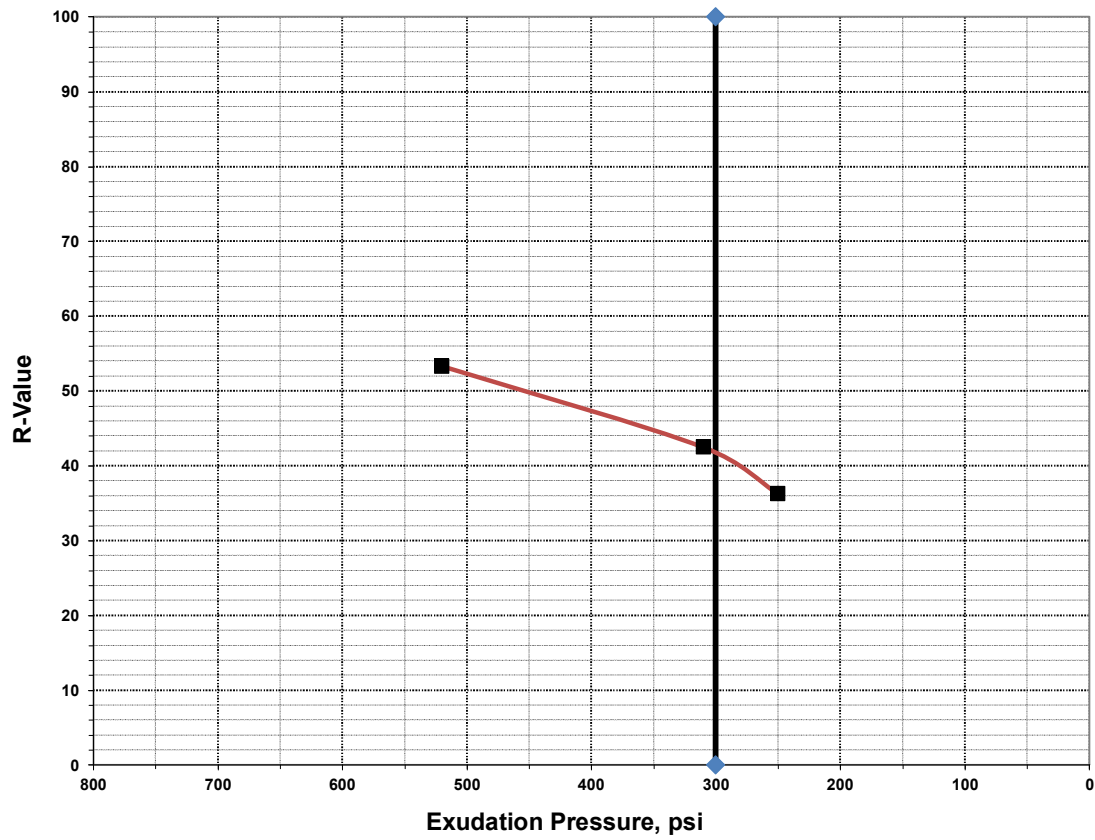
TEST DURATION: 665.7 sec

Atterberg Limit Results

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B0	2.5 - 4	NP	NP	NP	42.0	SM	SILTY SAND
⊠	B0	25 - 26.5	22	13	9		CL	LEAN CLAY with SAND
▲	B0	40 - 41.5	48	28	20		ML	SILT
★	B3	1 - 2.4	NP	NP	NP	40.5	SM	SILTY SAND



Specimen Identification	Compaction Pressure (psi)	R-Value at 300 psi
B-4 & B-5 Blend	290.0	42

R-Value Test

Client: Lodi Unified School District
Project: Lodi Middle School Additions
Site: 945 S Ham Ln., Lodi, CA
Project No.: NA245056

902 Industrial Way
Lodi, California 95240
(209) 367-3701



Client

Lodi Unified School District

Project

Lodi Middle School Additions

Sample Submitted By: Terracon (NA) **Date Tested:** 7/23/2024 **Project Number:** NA245056

Results of Corrosion Analysis

Sample Type	CARS	CARS
Sample Location	B0	B3
Sample Depth (ft.)	1.0	1.0
pH Analysis, ASTM G 51	8.26	8.22
Water Soluble Sulfate (SO4), ASTM D516 (%)	0.003	0.007
Sulfides, AWWA 4500-S ²⁻ D, (mg/kg)	< 0.1	< 0.1
Chlorides, AWWA 4500-CL ⁻ E (%)	0.002	0.001
Red-Ox, ASTM G 200, (mV)	+197	+175
Total Salts, AWWA 2520 B, (mg/kg)	227.8	185.5
Saturated Minimum Resistivity, ASTM G 57, (ohm-cm)	5,300	59,000

Reviewed By: Paula Arends
Paula Arends
Laboratory Manager

The tests were performed in general accordance with applicable ASTM and AWWA test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

Supporting Information

Contents:

Liquefaction Analysis

General Notes

Unified Soil Classification System

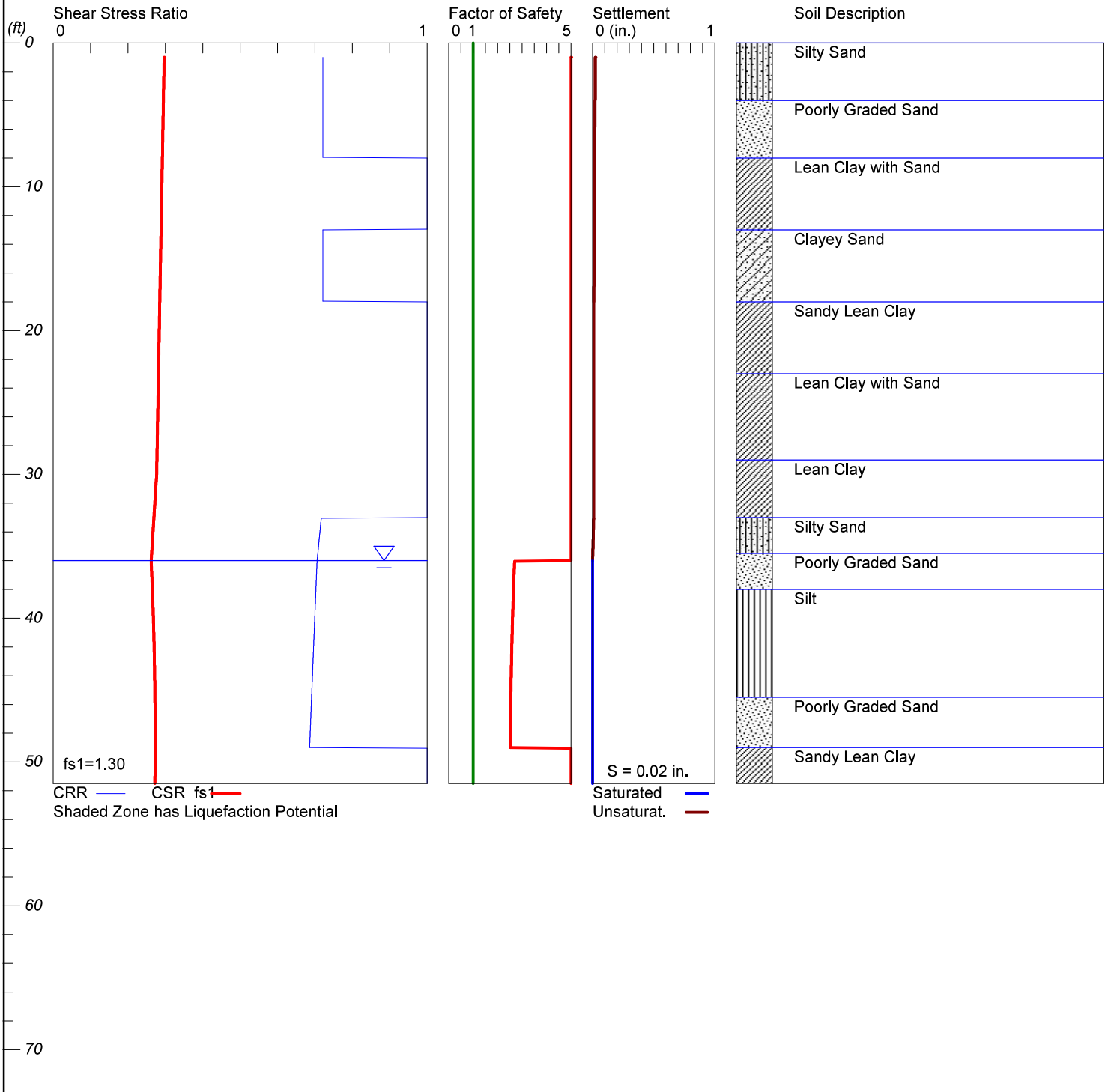
Note: All attachments are one page unless otherwise noted.

LIQUEFACTION ANALYSIS

NA245056 Lodi Middle School

Hole No.=B0 Water Depth=36 ft Surface Elev.=42

Magnitude=6.5
Acceleration=0.352g



General Notes

Sampling	Water Level	Field Tests
 Modified California Ring Sampler  Standard Penetration Test	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification
Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes
Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms						
Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance			Consistency of Fine-Grained Soils (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Relative Density	Standard Penetration or N-Value (Blows/Ft.)	Ring Sampler (Blows/Ft.)	Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)	Ring Sampler (Blows/Ft.)
Very Loose	0 - 3	0 - 6	Very Soft	less than 0.25	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	0.25 to 0.50	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium Stiff	0.50 to 1.00	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	1.00 to 2.00	8 - 15	10 - 18
Very Dense	> 50	> 99	Very Stiff	2.00 to 4.00	15 - 30	19 - 42
			Hard	> 4.00	> 30	> 42

Relevance of Exploration and Laboratory Test Results
Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification	
				Group Symbol	Group Name ^B
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	Cu≥4 and 1≤Cc≤3 ^E	GW	Well-graded gravel ^F
			Cu<4 and/or [Cc<1 or Cc>3.0] ^E	GP	Poorly graded gravel ^F
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}
	Sands: 50% or more of coarse fraction passes No. 4 sieve		Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}
		Clean Sands: Less than 5% fines ^D	Cu≥6 and 1≤Cc≤3 ^E	SW	Well-graded sand ^I
			Cu<6 and/or [Cc<1 or Cc>3.0] ^E	SP	Poorly graded sand ^I
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}
			PI > 7 and plots above “A” line ^J	CL	Lean clay ^{K, L, M}
	PI < 4 or plots below “A” line ^J		ML	Silt ^{K, L, M}	
	Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay ^{K, L, M, N}	
			Organic silt ^{K, L, M, O}		
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above “A” line	CH	Fat clay ^{K, L, M}
			PI plots below “A” line	MH	Elastic silt ^{K, L, M}
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay ^{K, L, M, P}
				Organic silt ^{K, L, M, Q}	
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

- ^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

^E $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

^F If soil contains ≥ 15% sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
- ^H If fines are organic, add "with organic fines" to group name.

^I If soil contains ≥ 15% gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

^M If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

^N PI ≥ 4 and plots on or above "A" line.

^O PI < 4 or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.

